Forensic Building Science, Inc.
657 Lincoln Avenue
St. Paul, MN 55105
T: 651.222.6509
www.forensicbuildingscience.com

Date: January 19, 2018

Client: Howarth Group

Property: Rocky Waters Motel, Inc. (Days Inn Gatlinburg on the River)
324 Hemlock Street
Gatlinburg, TN 37738

Dear Mr. Howarth:

This letter will serve as an interpretation with recommendations from our particulate matter sampling at the above referenced property. Air sampling and tape lift sampling was performed by Forensic Building Science (FBS) on January 3 and January 4, 2018 in response to a recent brush fire.

I. Summary of Opinions

Based on the site inspection and documentation of the damages conducted by FBS, including review of the results of our soot sampling I have concluded that the property in question located at 324 Hemlock Street, Gatlinburg, TN 37738 has been damaged by the wildfire through the deposition of soot and ash throughout the attic assemblies, CMU block room divider walls, interior partition walls, and ducting. Based on the sample results, and the type of construction in the building, it is my opinion that the brush fire caused damage to the building through the deposition of carcinogenic soot into the entire attic, the CMU block walls, suspended ceiling spaces and ducts. This soot is still viable in the ambient air as evidenced by our sampling results.

II. Sampling Results

N.G. Carlson Analytical, Inc.
216 16th Ave. S.W.
New Brighton, MN 55112 January 13, 2018

RE: Days Inn 324 Hemlock St., Gatlinburg, TN 37738

Air-o-cell cassette samples (January 3, 2018 – January 4, 2018)

Location (description from chain of custody)	Trace density	Primary Particles	Notes
1– Room 407 interior wall (30 liters)	Moderate	Char [<1] Soot [<1]	**Asp/Pen Heavy**
4 Room 405 bathroom ventilation (30 liters)	Moderate	Char [1-4] No Soot	
6 Attic space above rooms 409 – 412 CMU interior fire wall (30 liters)	Moderate	Char [1-2] Soot [<0.5]	
9 Room 412 dividing CMU (LE) wall (30 liters)	Light to Moderate	Char [1-2] No Soot	
10 Room 417 interior wall bathroom vanity (30 liters)	Light	Char [<0.5] Soot [<0.5]	**Asp/Pen moderate to light**
12 – Room 421 dividing CMU (LE) wall (30 liters)	Heavy	Char [10-20] No Soot	
13 – Room 319 dividing CMU (LE) wall (30 liters)	Heavy	Char [4-6] No Soot	
14 – Room 315 bedroom interior wall (30 liters)	Light	Char [<0.5] Soot [<0.5]	

16 – Room 302 bedroom interior wall (30 liters)	Moderate	Char [<0.5] Soot [<0.5]	
17 – Room 208 dividing CMU (RE) wall (30 liters)	Moderate	Char [2] Soot [<0.5]	
19 – Elevator shaft 4th floor going down (30 liters)	Heavy	Char [2] Soot [<0.5]	
20 – 3rd floor storage room ambient air (75 liters)	Moderate	Char [1] Soot [<0.5]	

Tease tape samples (January 3, 2018 – January 4, 2018)

Location (description from chain of custody)	Trace density notes	Primary Particles	Notes
2 – Room 407 wood burning fire place – tape lift		**Char [50+]** No Soot	
3 – Attic space above room 403 & 404, wood joist – tape lift		Char [2-5] No Soot	
5 – Attic space above rooms 408 – 412 metal pipe - tape lift		Char [1-3] Soot [<0.5]	

7 – Attic space above rooms 418-422 wood joist – tape lift		Char [1-2] Soot [<0.5]	
8 – Attic space above rooms 418 – 422 - bulk insulation		Char [<1] No Soot	
11 – Room 421 wood burning fire place - tape lift		Char [3-7] Soot [1-2]	
15 – Room 305 dropped ceiling in bathroom metal pipe electrical chase way – tape lift		Char [<1] Soot [2-6]	
18 – Room 214 metal pipe in dropped ceiling – tape lift		Char [<1] Soot [1-2]	

Char and soot-like particle interpretation:

Less than 0.5 particles per field (400x) - negligible impact of smoke
0.5 and 2.0 particles per field (400x) - limited impact of smoke
2.0 and 10 particles per field (400x) - moderate impact of smoke
10 - 50 particles per field (400x) - Significant impact of smoke
> 50 particles per field TNTC - Major impact of smoke
* Several large clusters of soot-like particles noted

Methods:
The Air-o-cell Cassette traces were identified under light microscopy viewed at 100x, 200x and 400x. Lacto fuchsin stain in 85% lactic acid was used to aid in identification.

No chemical identification was conducted on the soot-like, char-like particles, and carbon black-like particles. Presumptive identification was based on particle morphology.

Discussion:
Soot levels varied from not noted to major on the tease tape samples.
Char levels varied from negligible to significant on the tease tape samples.

Char levels varied from not noted to moderate on the air samples.
Soot levels varied from not noted to limited on the air samples.

Sincerely,

Neil G. Carlson, C.I.H.
N.G. Carlson Analytical, INC.

III. Sampling Discussion

Typically, in post fire remediation strategies recommended by fire restoration companies and insurance companies, walls, ceilings and floors that do not show signs of actual fire damage (e.g. char, physically burned materials) are left in place and either surfaced cleaned or repainted. Post remediation complaints from building occupants often include descriptions of a "lingering smoke smell" months and years later, particularly when large variations in temperature and humidity occur. Soot left in these cavities is "recharged" by this increase in water vapor drive from the humidity causing the smell to present.

FBS collected a total of 20 interior samples at the Days Inn Gatlinburg on the River building. The primary purpose of the sample collection was to determine whether or not smoke soot consistent with the reported fire event is in the ceiling, wall, floor and ducting cavities, wire chase ways and other open bypass areas, and to assist in developing recommendations for repairs.

All the air samples were collected with an air sampling pump calibrated to run at a volume of 15 liters per minute. The sample duration varied by location. The air samples were collected with Air-O-Cell sampling cassettes.

The ambient air samples are collected for a five-minute sample period to use for comparison purposes. Tape lifts and were collected from visible surfaces where no sign of soot was viewed.

The sample locations were chosen based on my training, education and experience and the site-specific inspections and similar projects with similar failure mechanisms. All the samples were collected and entered in to a sample chain of custody. After the sampling was completed, the samples were delivered to Neil Carlson, CIH, of NG Carlson Analytical. The analysis of the results is included in the report from him.

In addition to the sample chain of custody, the locations of all the samples were written down in a site log book so that the information can be more easily viewed.

IV. Description of Soot

Definition of Soot:
Soot is a general term that refers to the black, impure carbon particles resulting from the incomplete combustion of a hydrocarbon. It is more properly restricted to the product of the gas-phase combustion process but is commonly extended to include the residual pyrolyzed fuel particles such as cenospheres, charred wood, petroleum coke, etc. that may become airborne during pyrolysis and which are more properly identified as cokes or chars. The gas-phase soots contain polycyclic aromatic hydrocarbons (PAHs). The PAHs in soot are known mutagens and probable human carcinogens. Soot is in the general category of airborne particulate matter, and as such is considered hazardous to the lungs and general health. Soot is classified as a "Known Human Carcinogen" by the International Agency for Research on Cancer (IARC).[i]

V. Conclusions

Soot and/or Char was found in 20 out of 20 samples taken. Tow samples were taken as base line comparisons onside working wood burning fireplaces. This was done to compare morphology of the particulate matter inside the fire places to the particulate matter from the wild fire. Wild fire soot was typically seen in grape cluster patterns consistent with mixed fuels and components as opposed to single wood origin inside fire places. Char from the wild fire also differed from char in the fireplaces. In our opinion, the soot found throughout the buildings is from the wild fires. Generally, attic areas, drop ceiling spaces and the open cores of CMU blocks were most affected, while exterior walls and interior partition walls were affected at isolated locations. This would be consistent with the open atmosphere design of the buildings.

Based on the results of the sampling, all insulation should be removed from the attics, and all framing, exposed roof deck sheathing, ducting, piping and top surface of exposed upper ceiling in the attics should be cleaned by HEPA and back sprayed with BIN primer. During this work, all interior and interior walls that are exposed during the attic work should also be cleaned and reinsulated. Soot inside CMU block cells will be harder to clean. A hole should be drilled at the top and bottom of each cell. The cell should be pressure washed and dried. Then resealed. As an alternative, the cells can be filled with a closed cell foam.

All top floor ceiling lights and electrical outlets should be detached, cleaned and reset. To eliminate cross contamination removal should be done using enclosed critical containments and HEPA units.

Forensic Building Science's opinions and recommendations are made without regard to coverage. The Insurance Carrier determines coverage and any issues related to coverage are the responsibility of the Insured and the Carrier. Discovery is ongoing. Additional testing and inspections may need to be performed and additional and/or supplemental information and opinions may be contained in future reports issued by Forensic Building Science, Inc. This report is the exclusive property of the client noted previously and cannot be relied upon by a third party. Copies of this report are released to third parties only by written permission of the client.

Adam Piero, Field Investigator — January 19, 2018 Date

Thomas Irmiter, President & Owner — January 19, 2018 Date

[1] Reference

US Department of Health and Human Services. Public Health Service, National Toxicology Program. Report on Carcinogens, Twelfth Edition. 2011. Accessed at http://ntp.niehs.nih.gov/ntp/roc/twelfth/roc12.pdf on June 14, 2011.

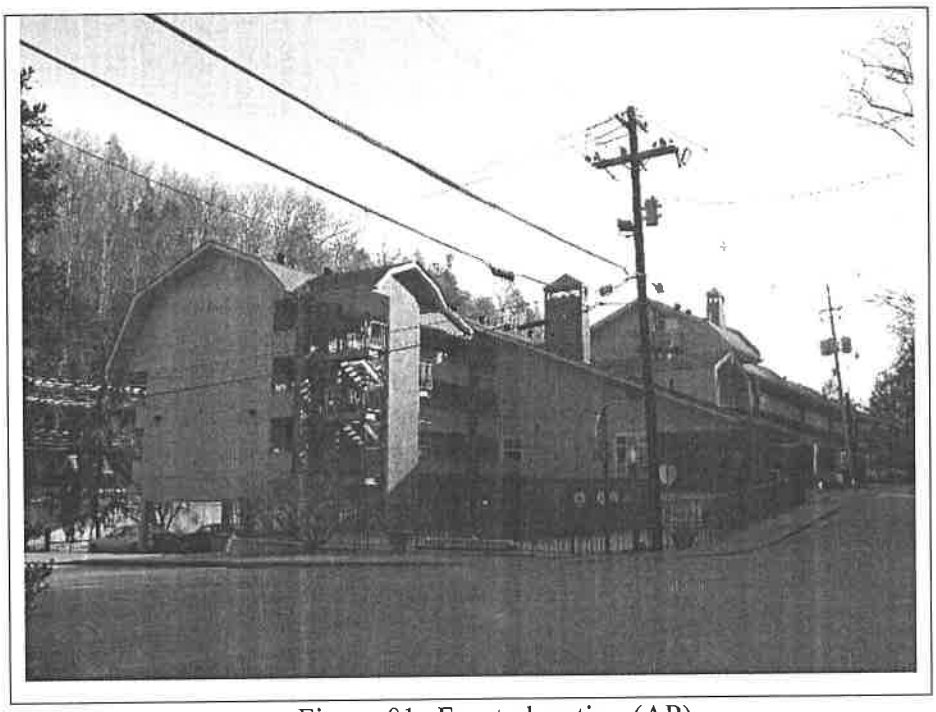


Figure 01. Front elevation (AP)

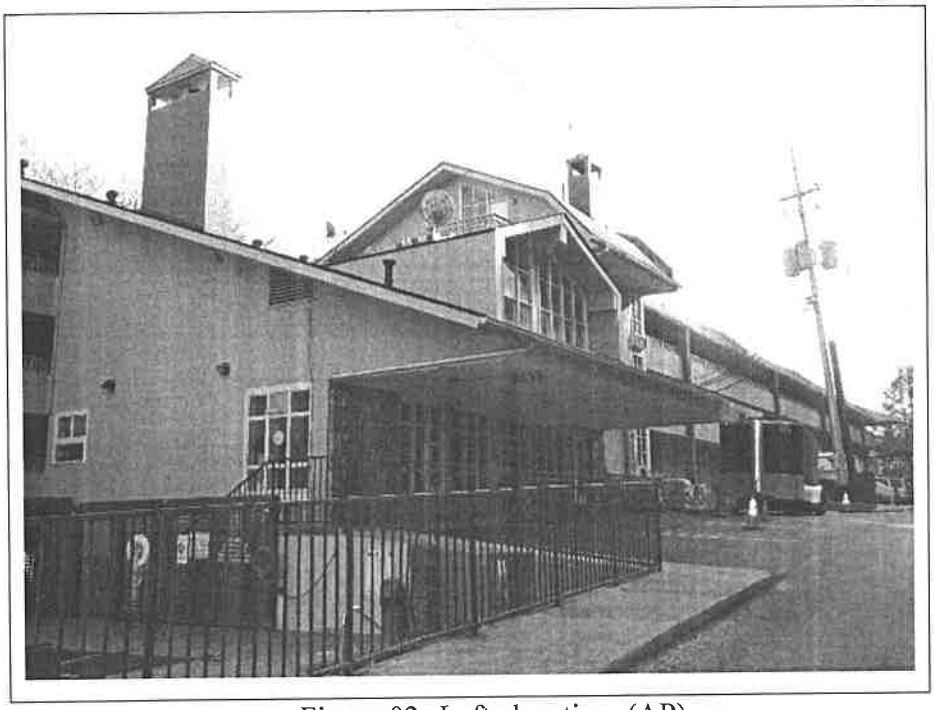
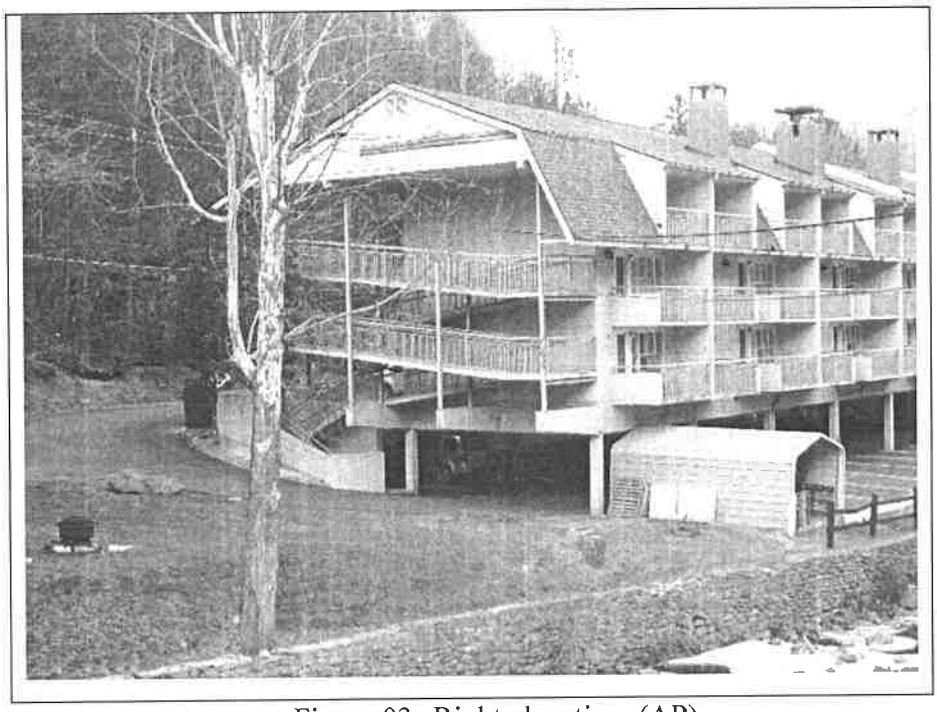


Figure 02. Left elevation. (AP)



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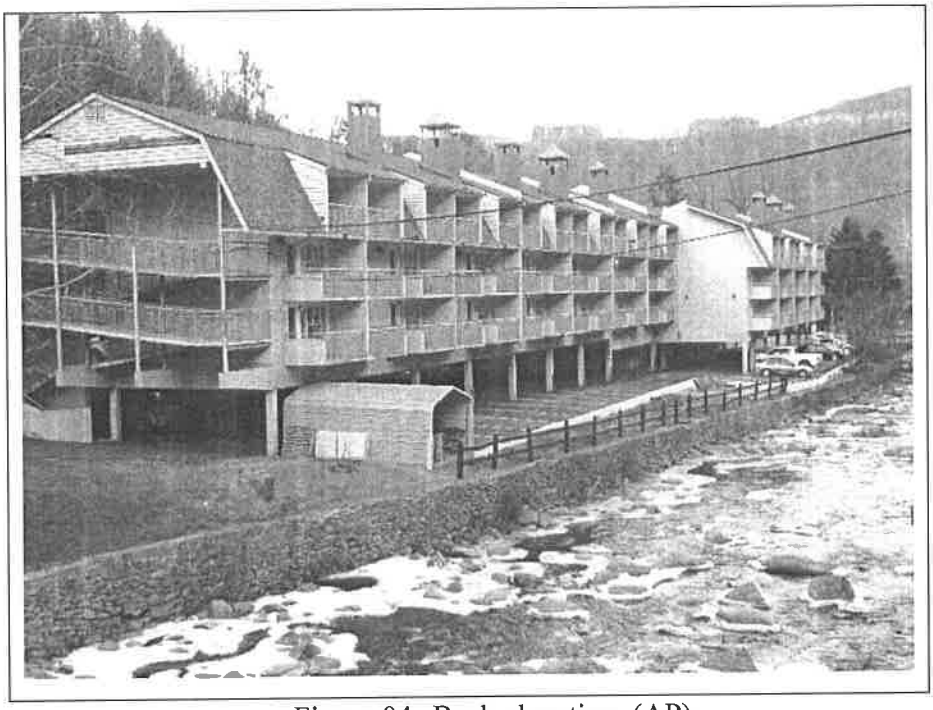

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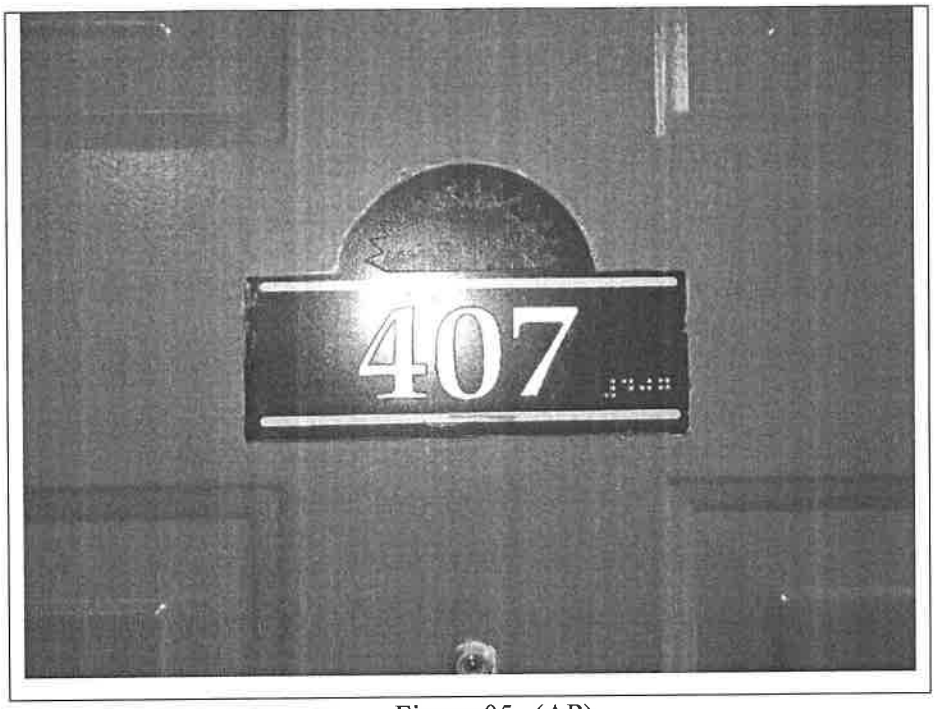

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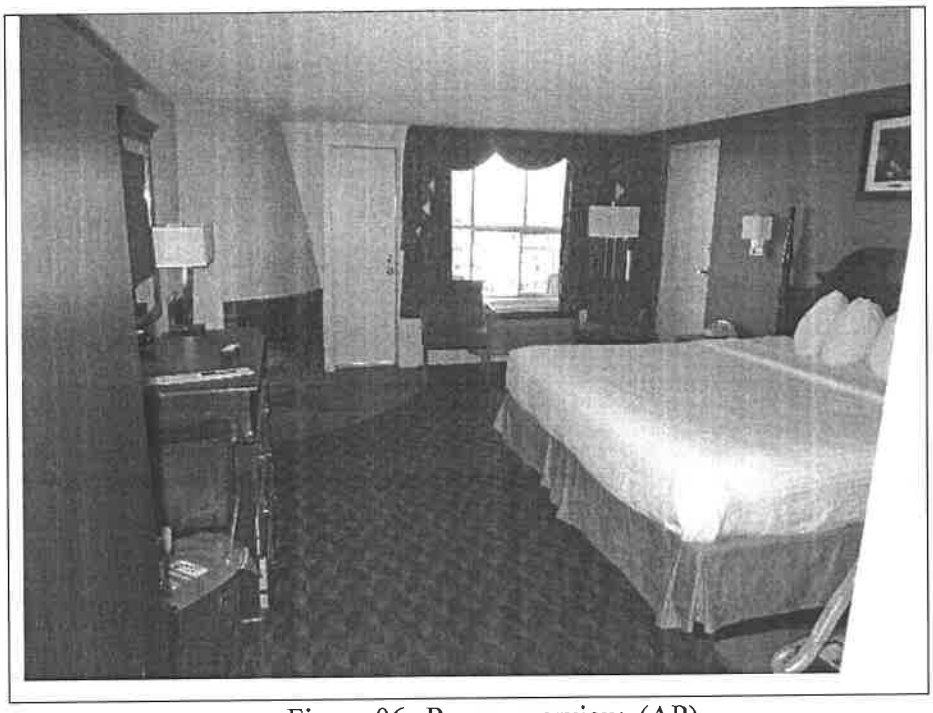
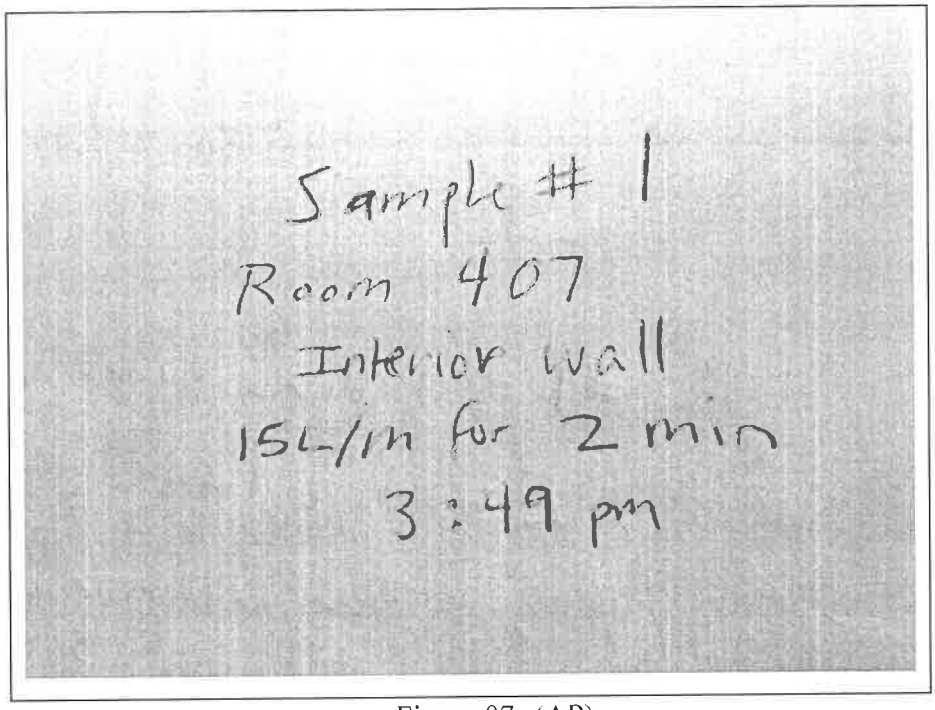


Figure 06. Room overview. (AP)



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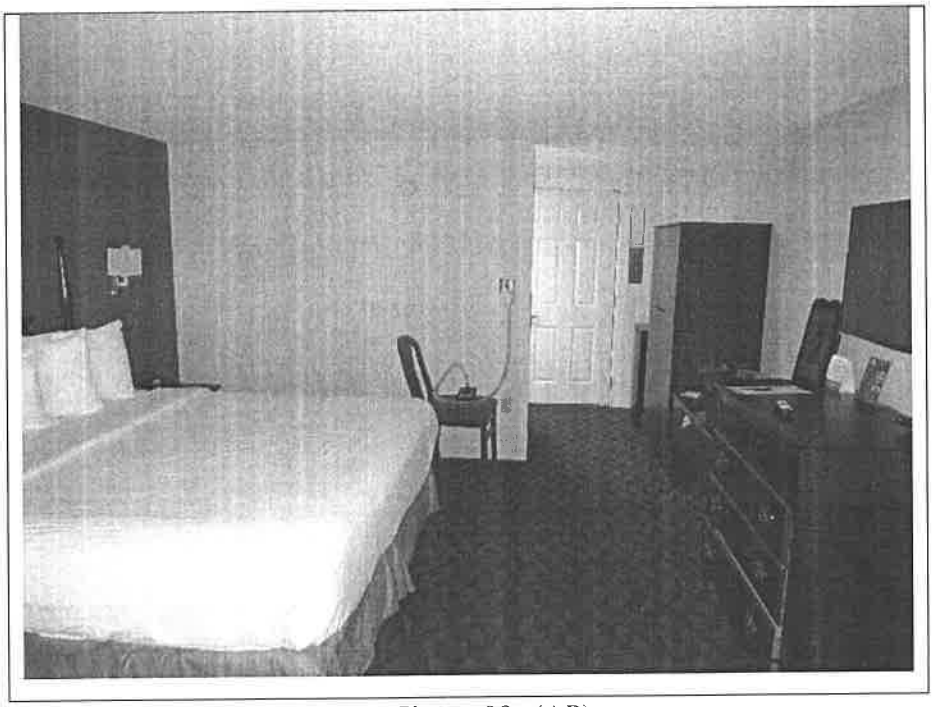

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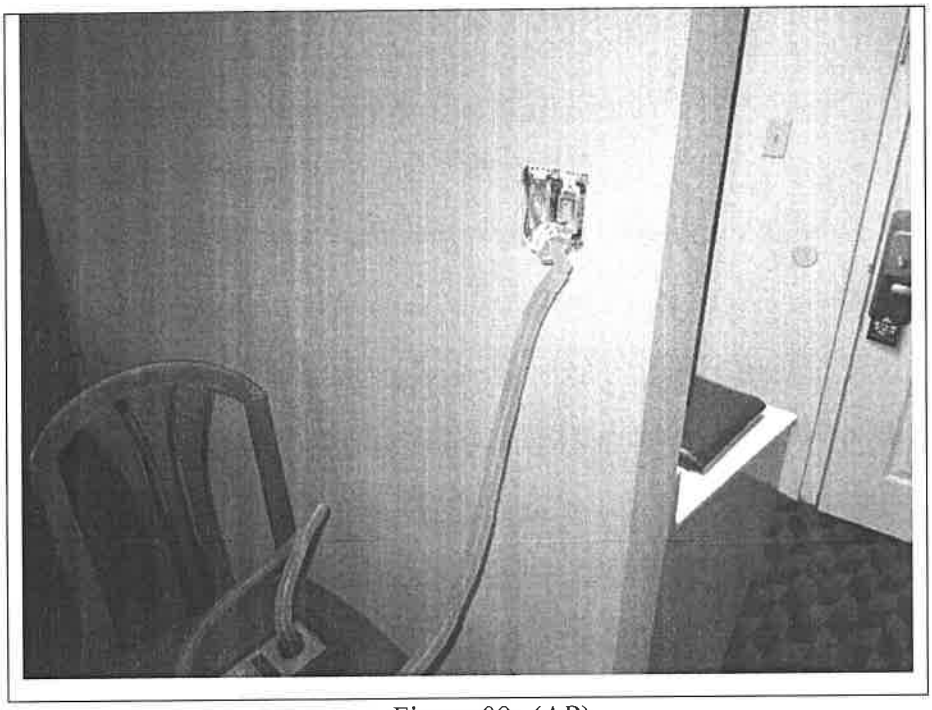

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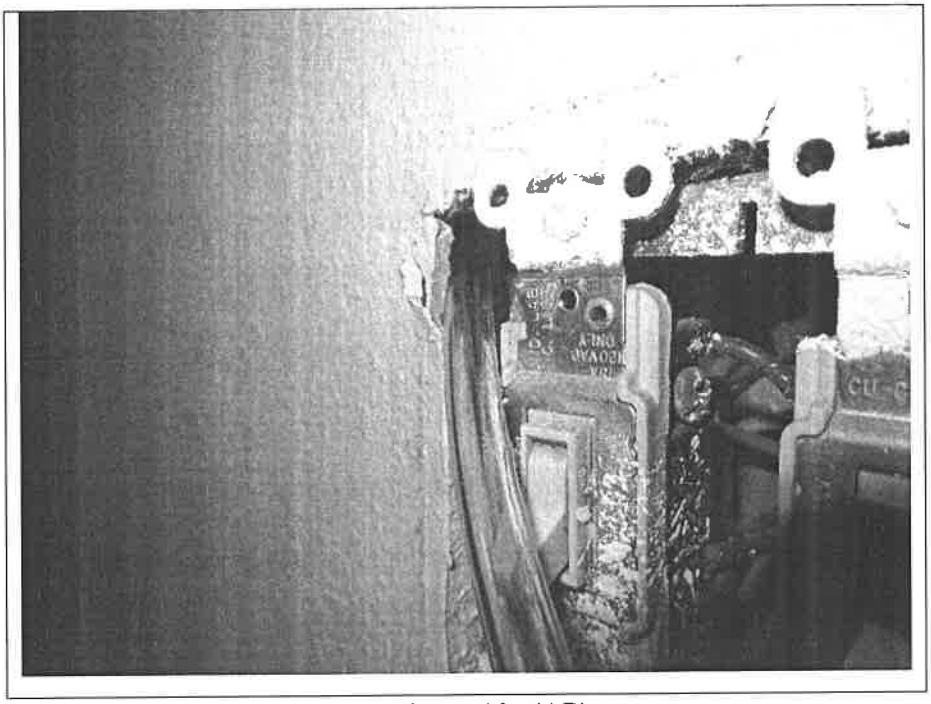

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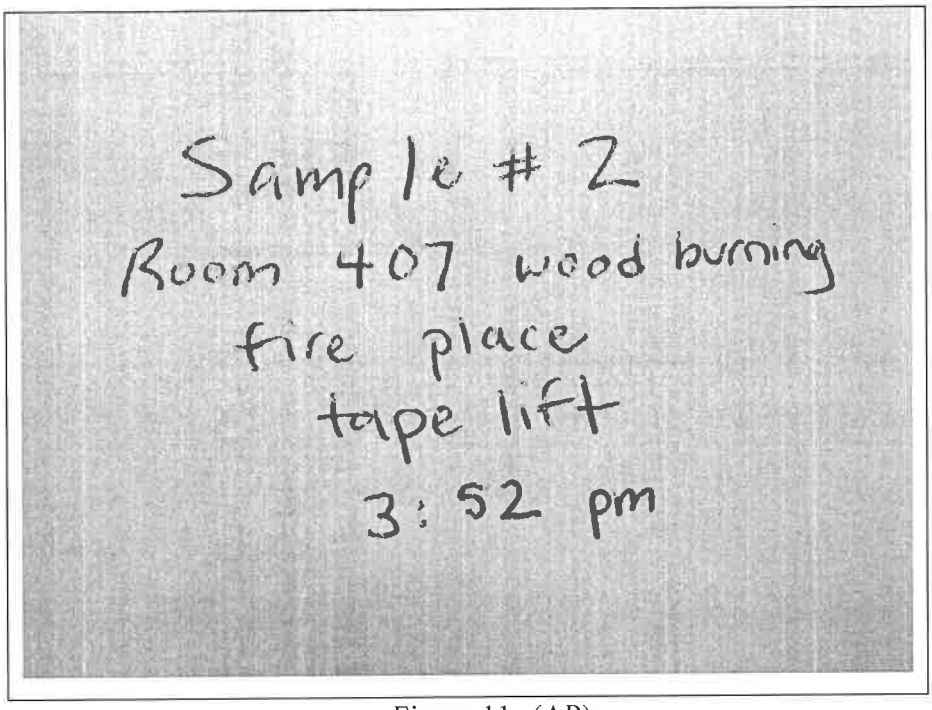

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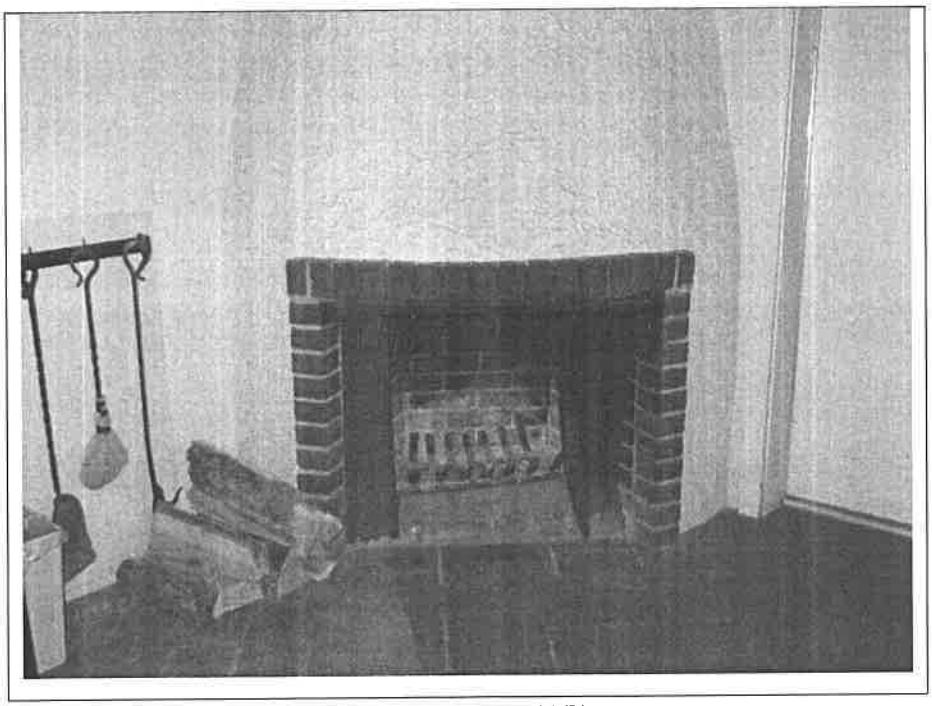

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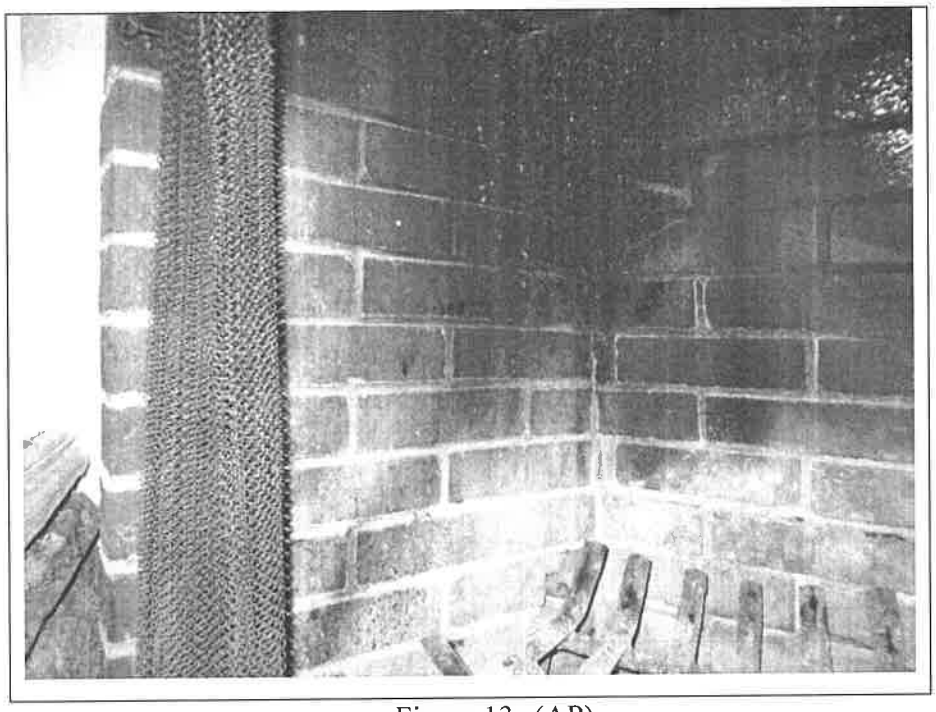

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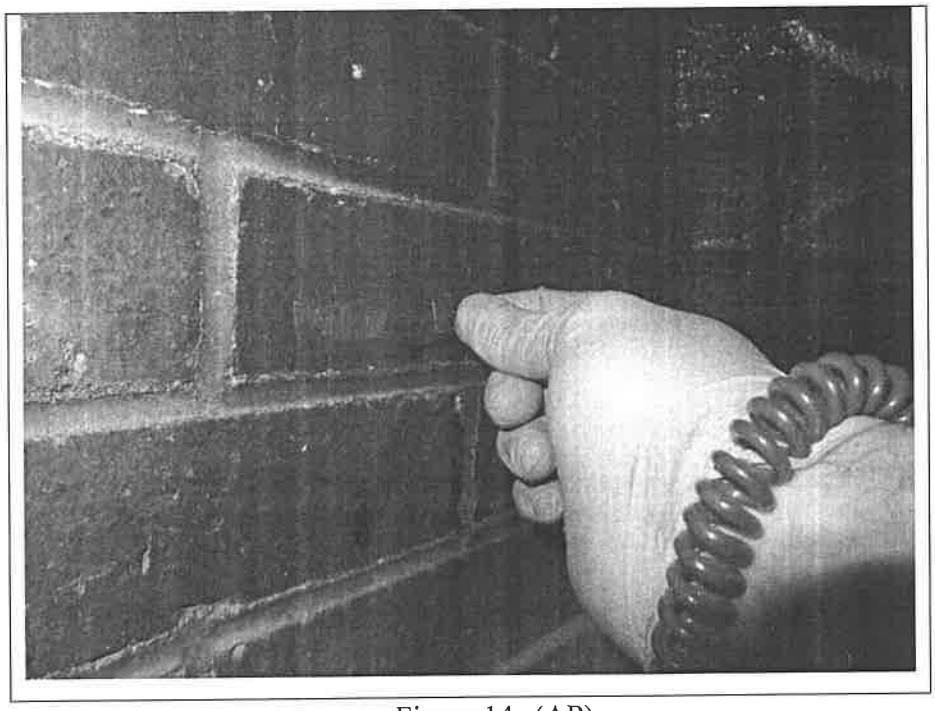

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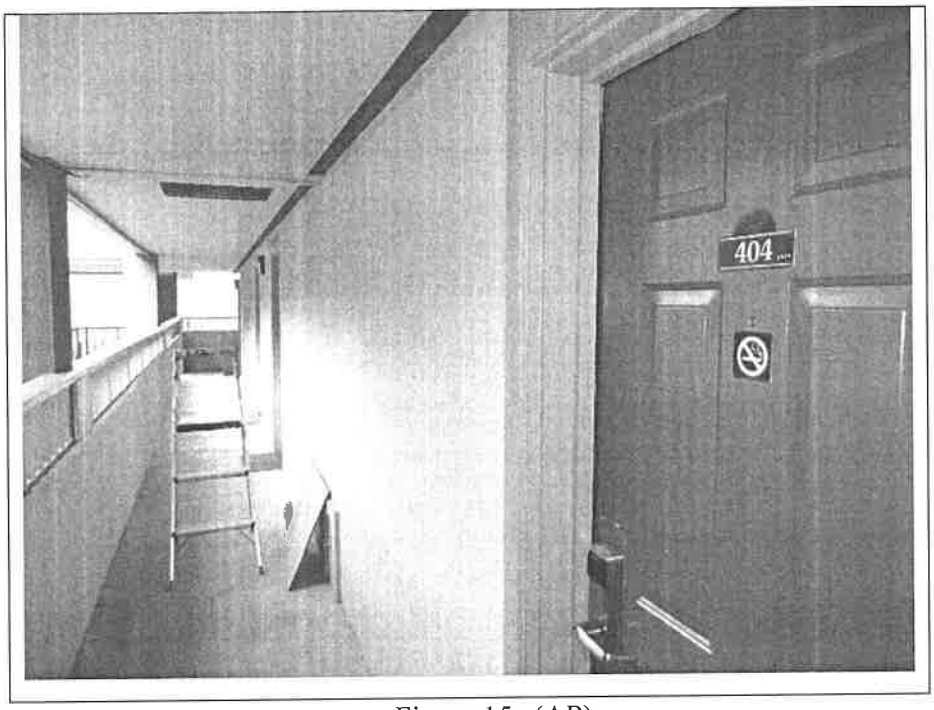

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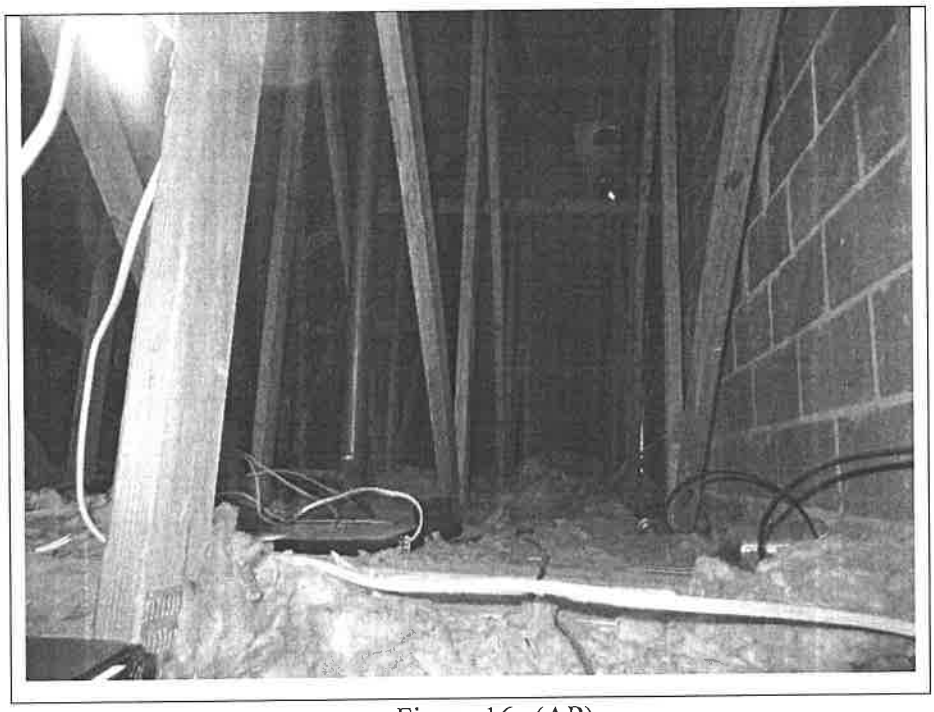

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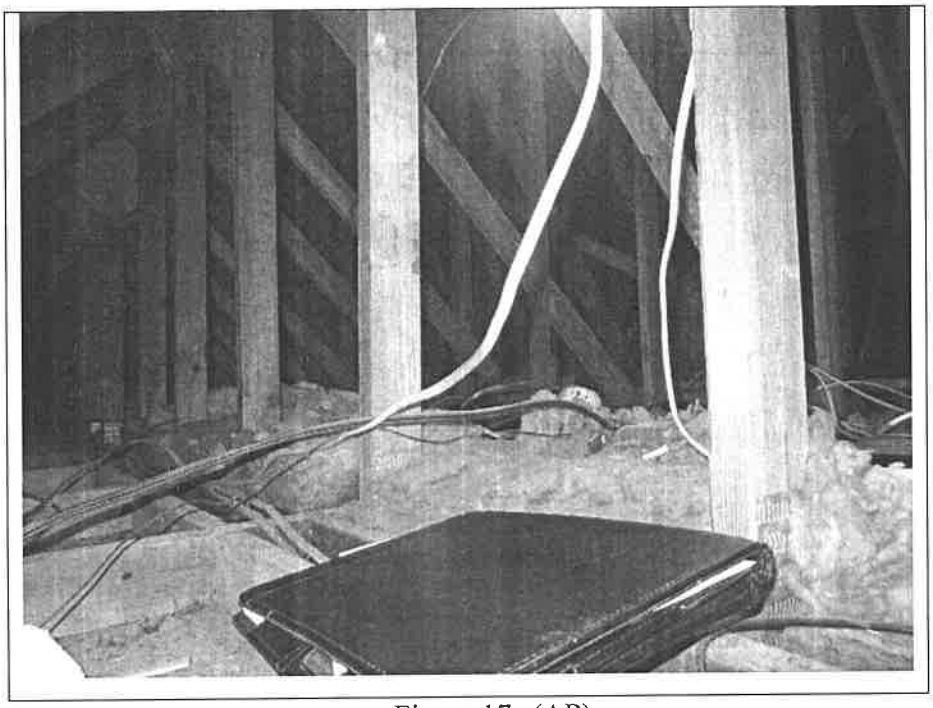

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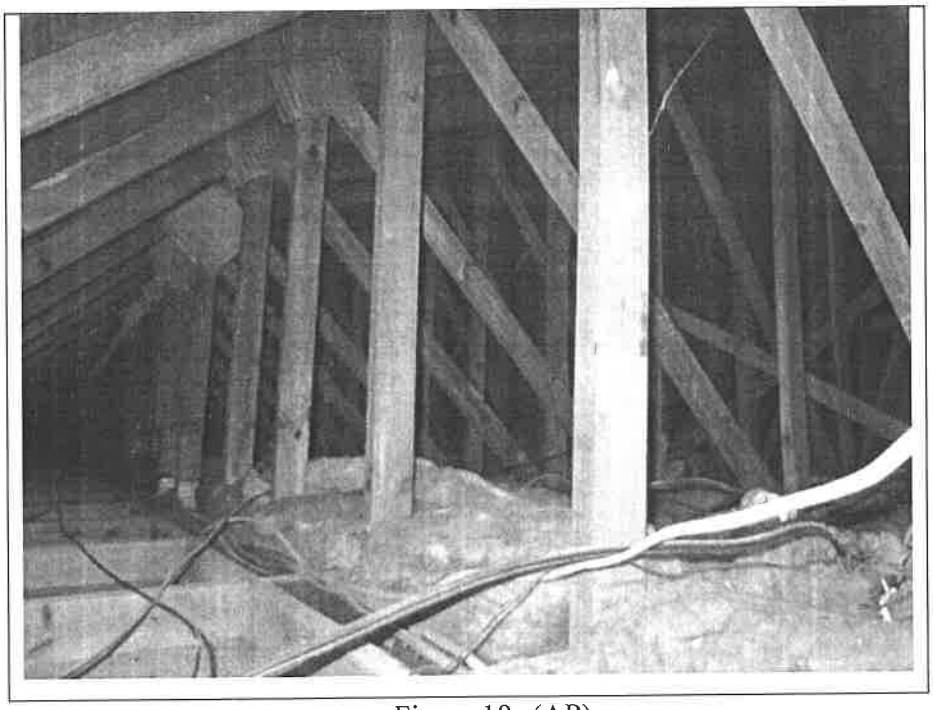

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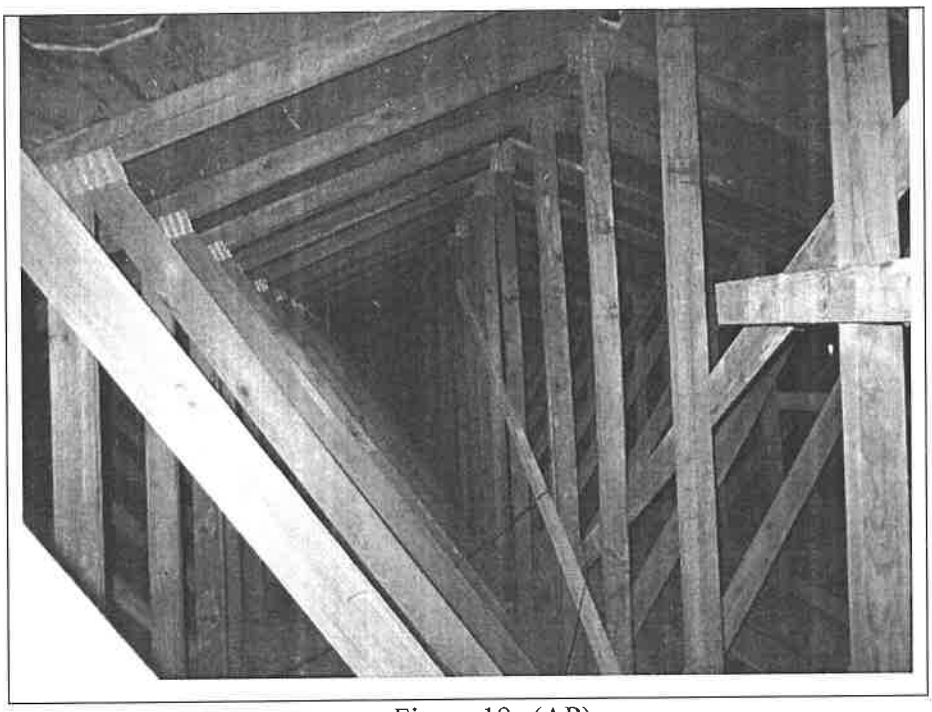

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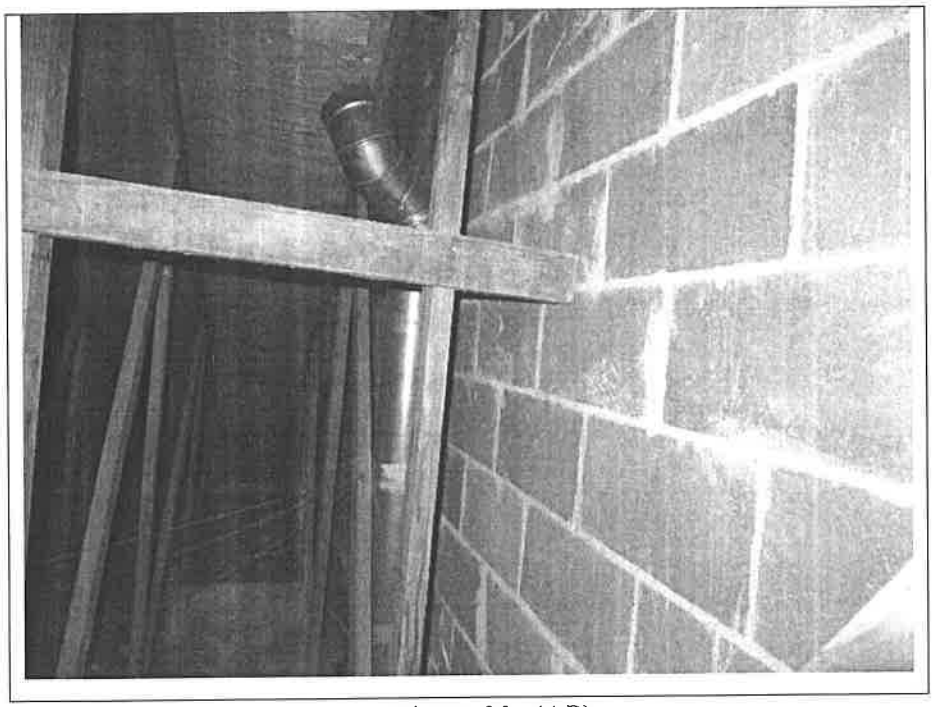

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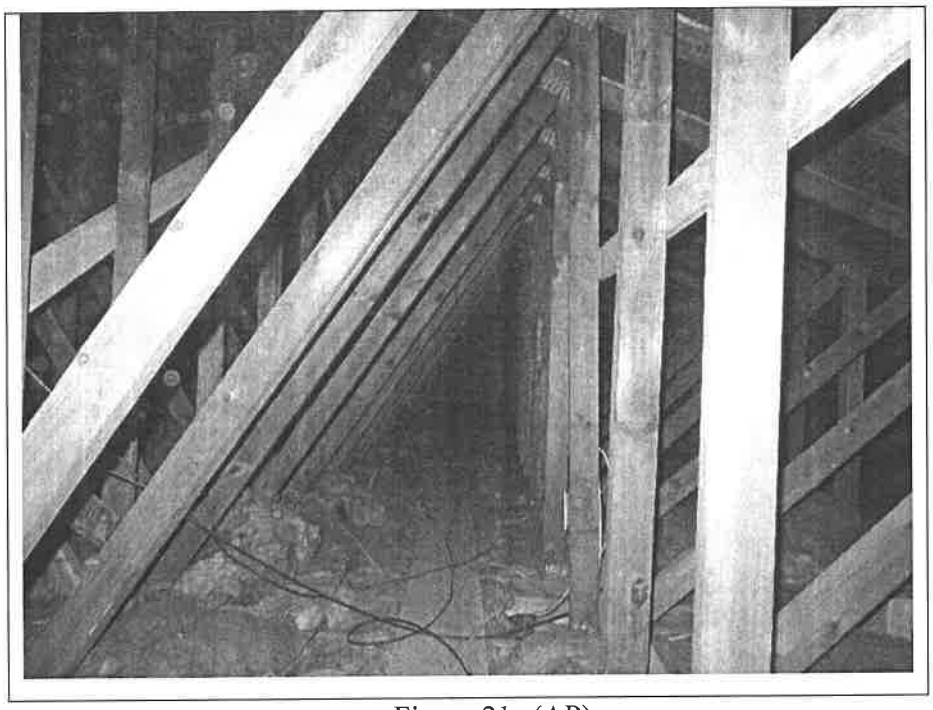

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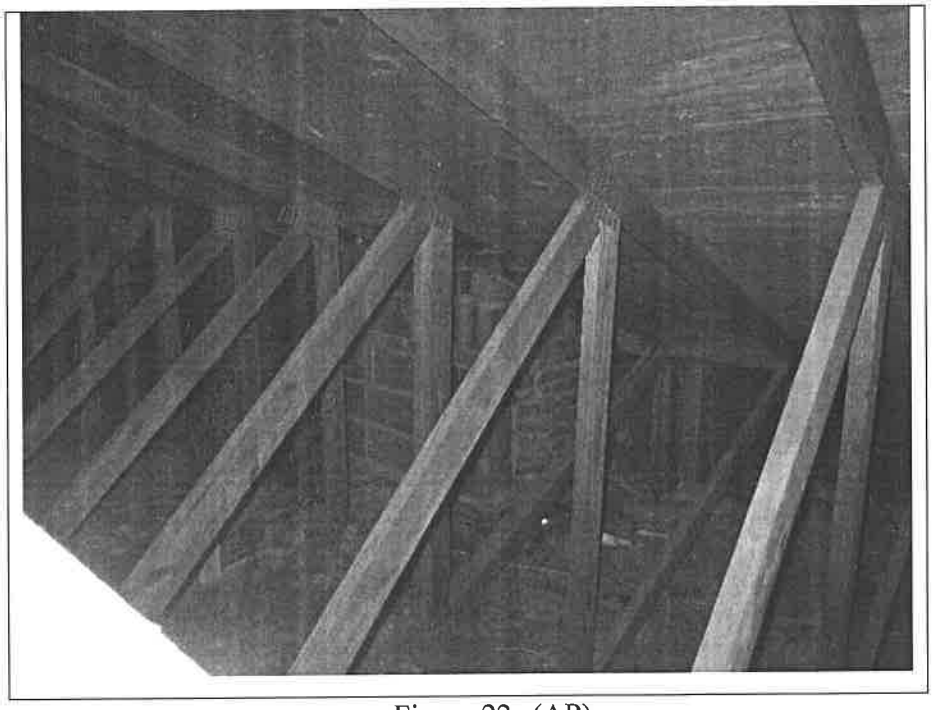

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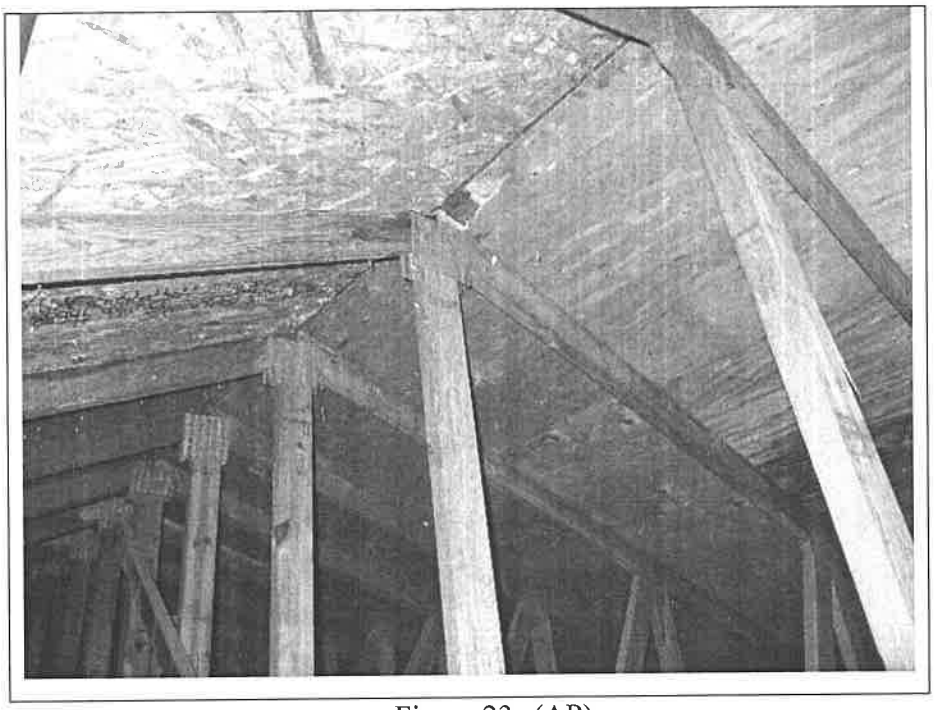

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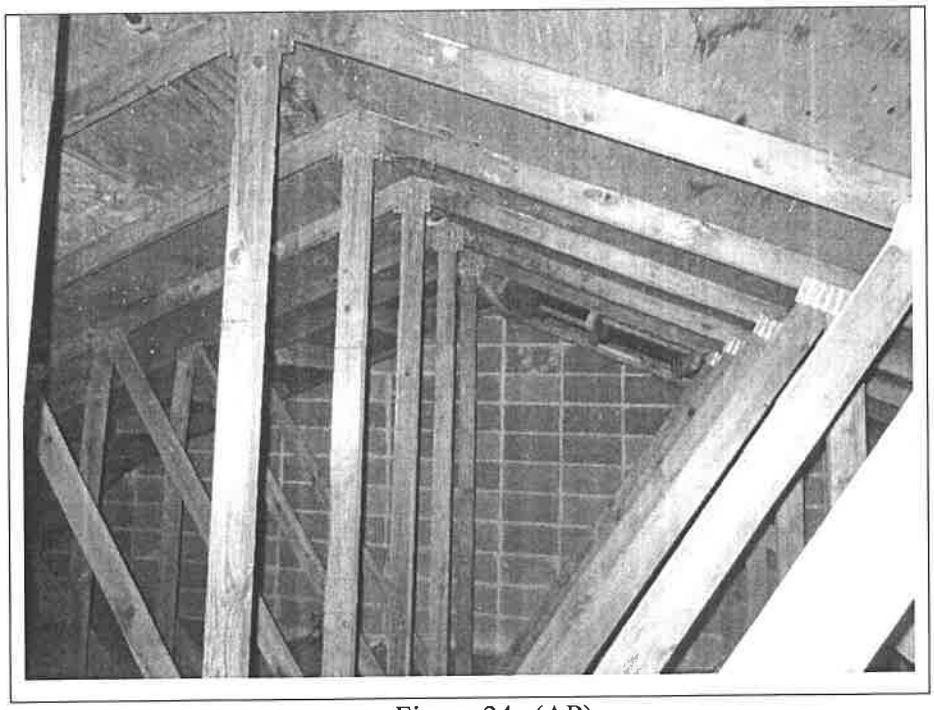

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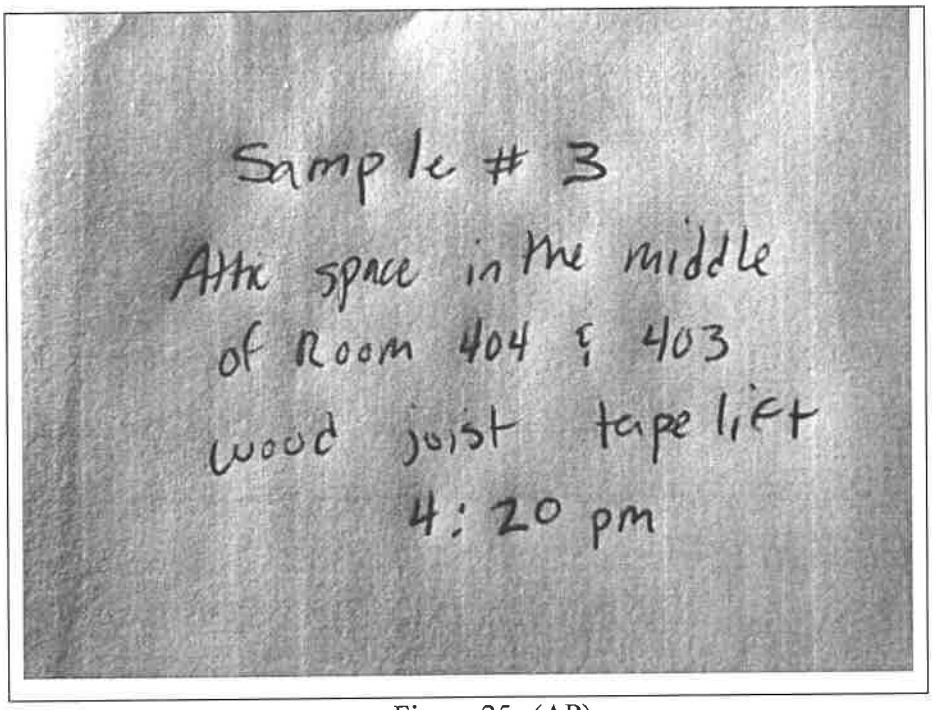

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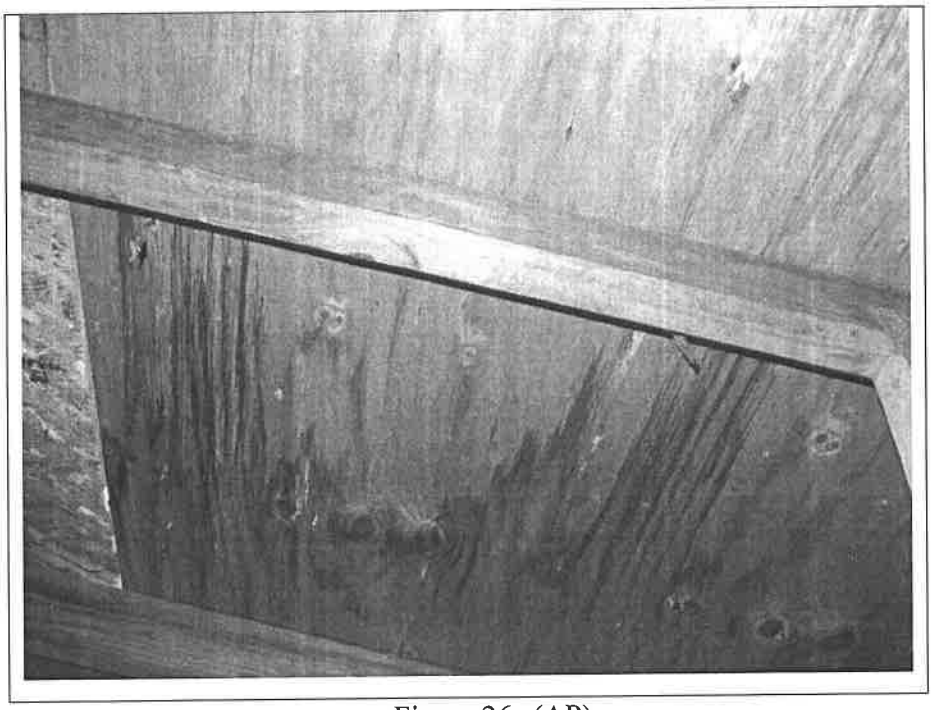

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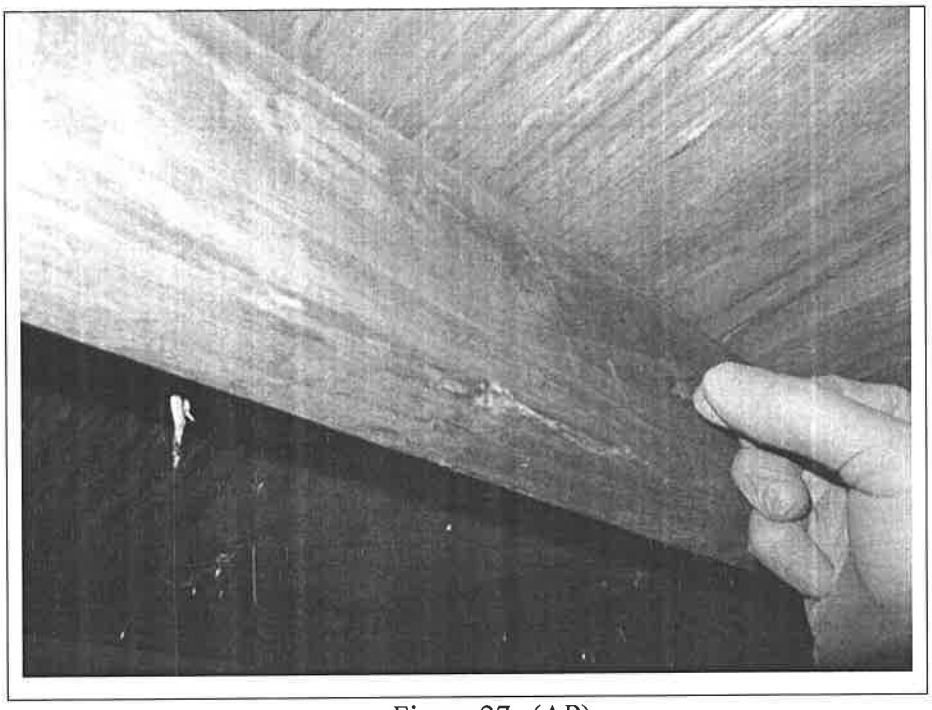

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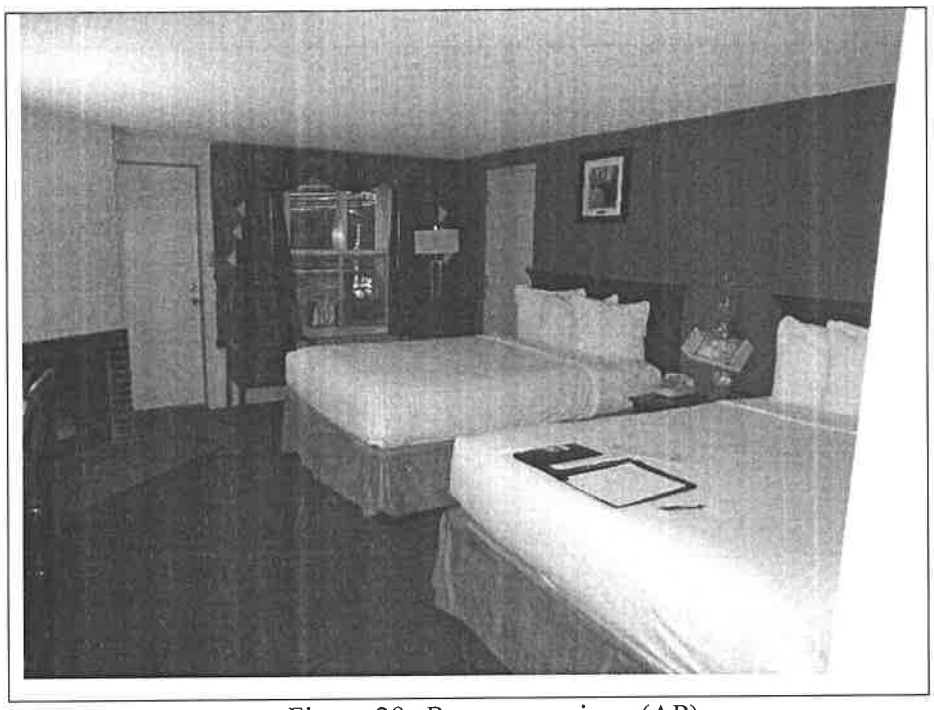
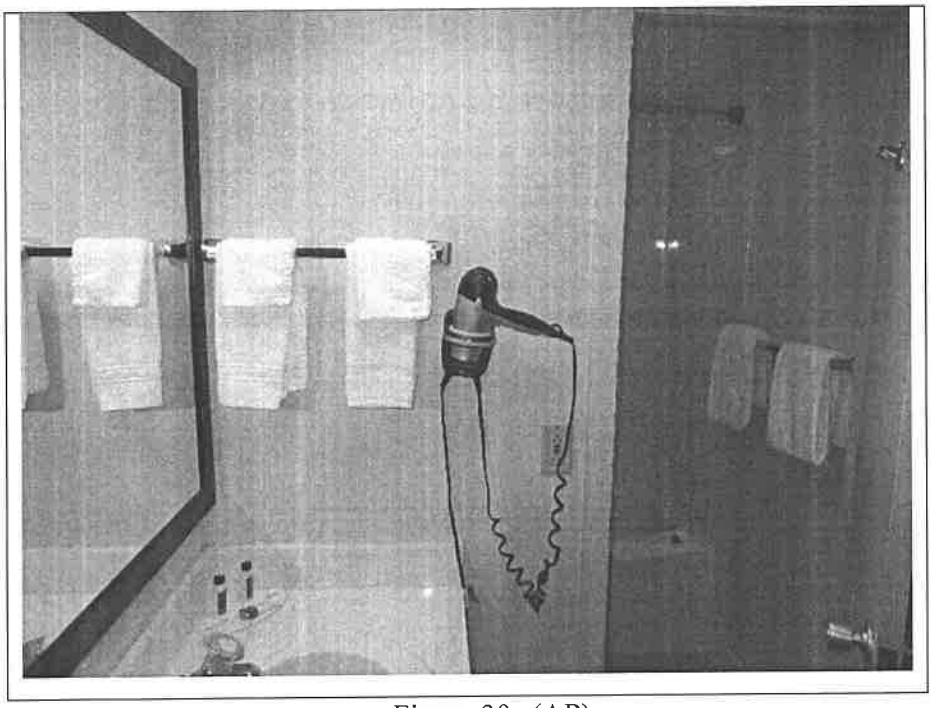


Figure 29. Room overview. (AP)



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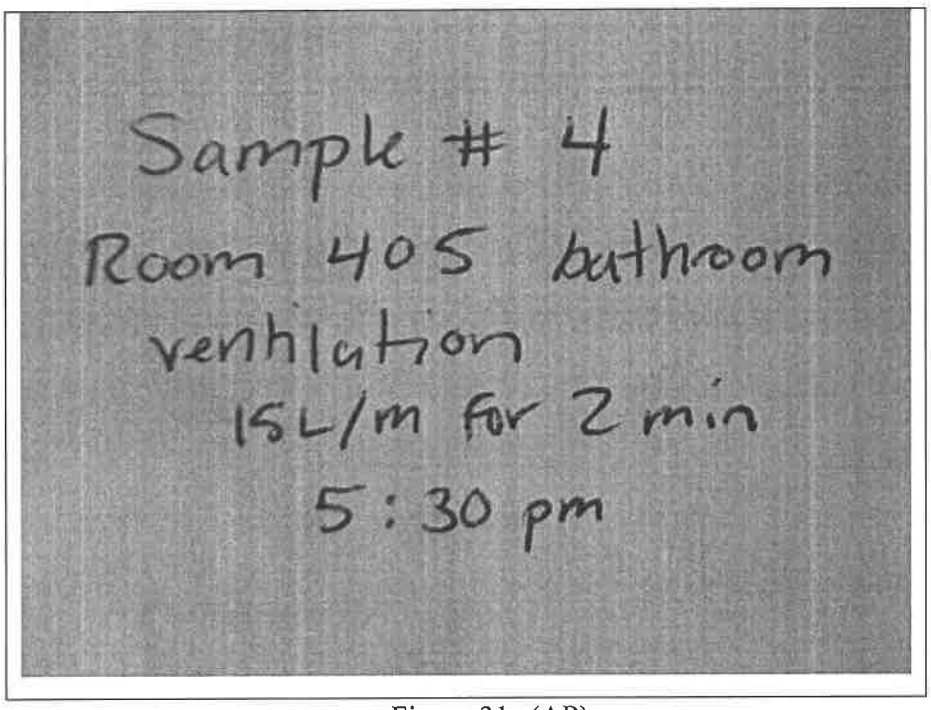

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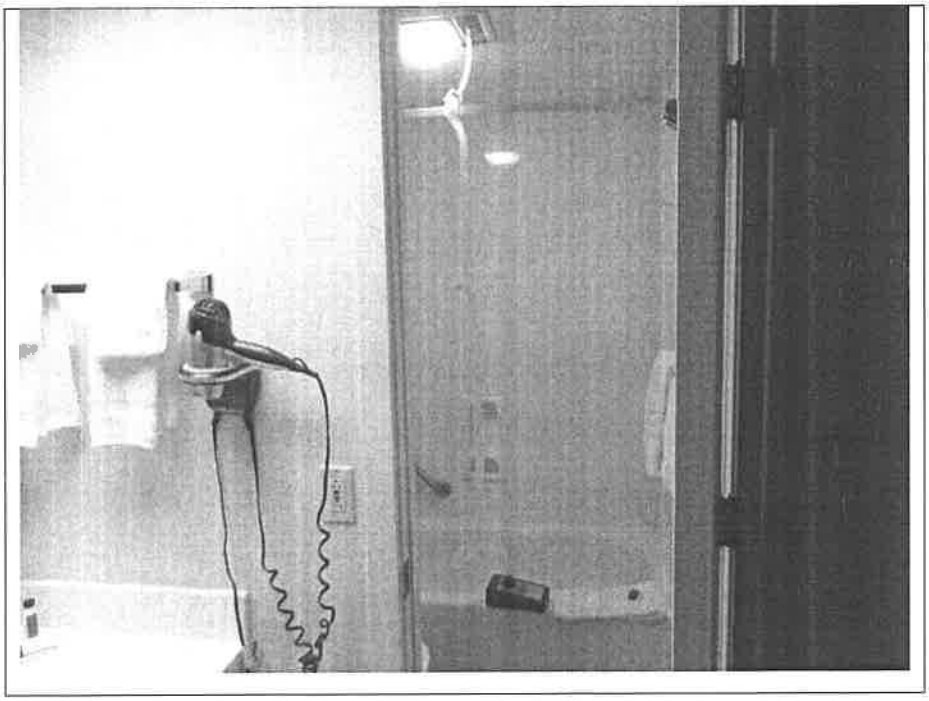

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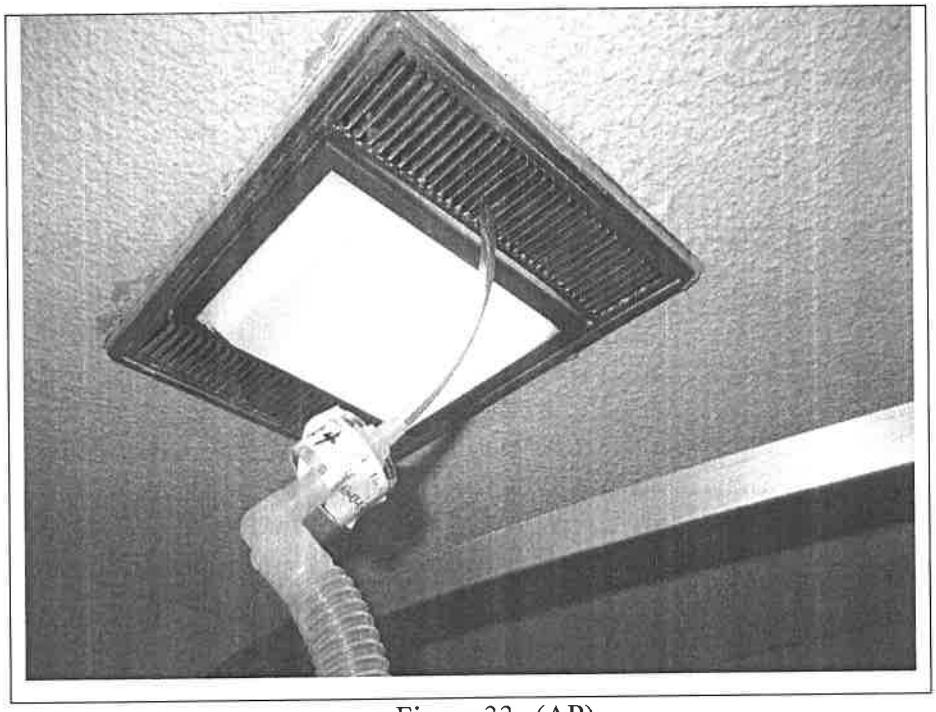

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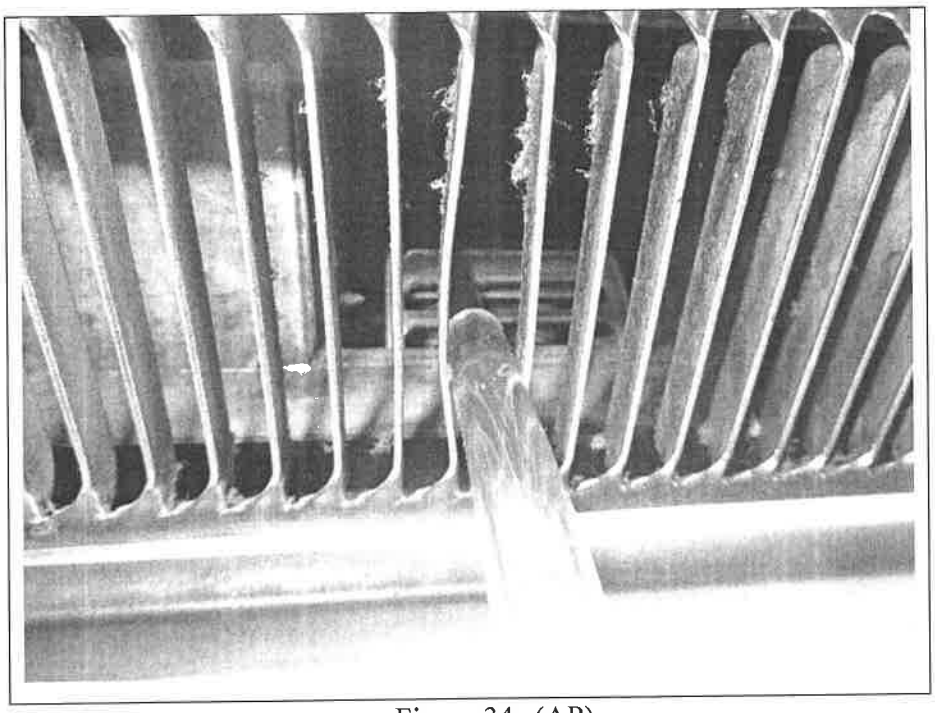

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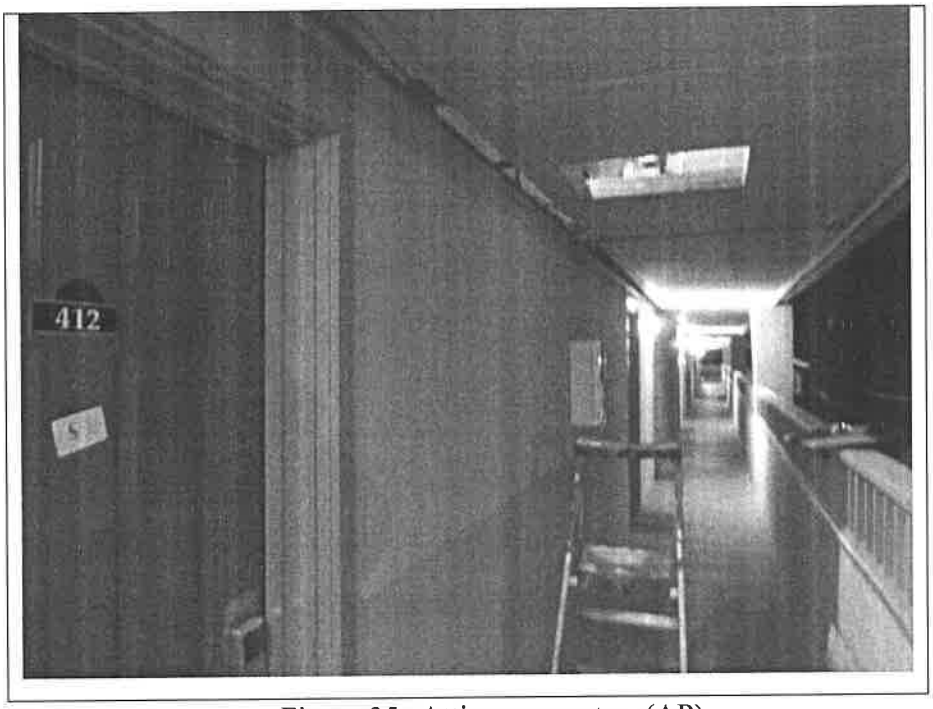

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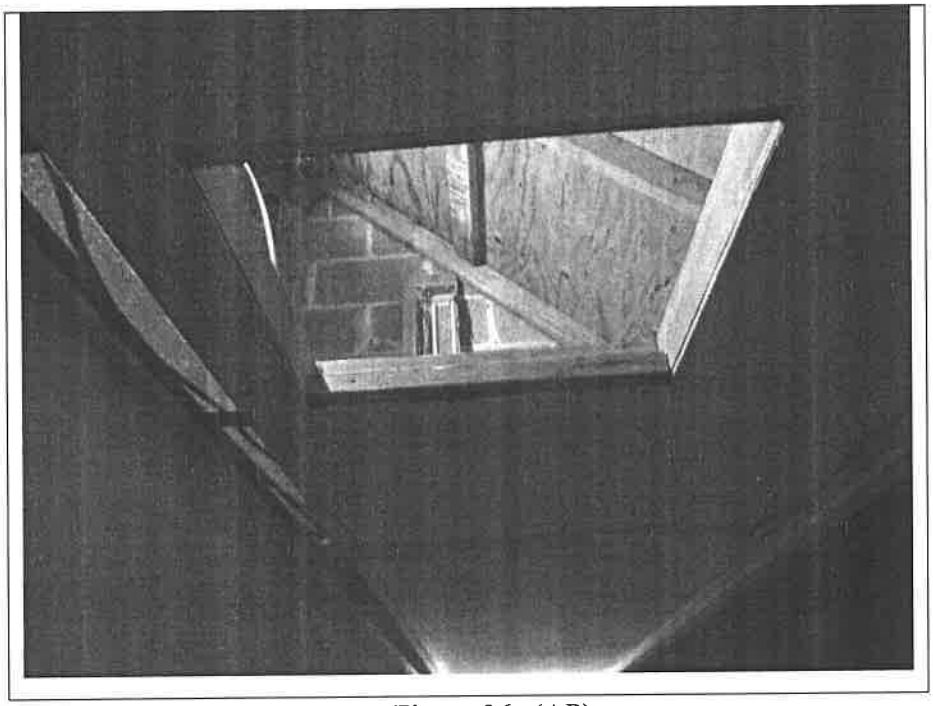

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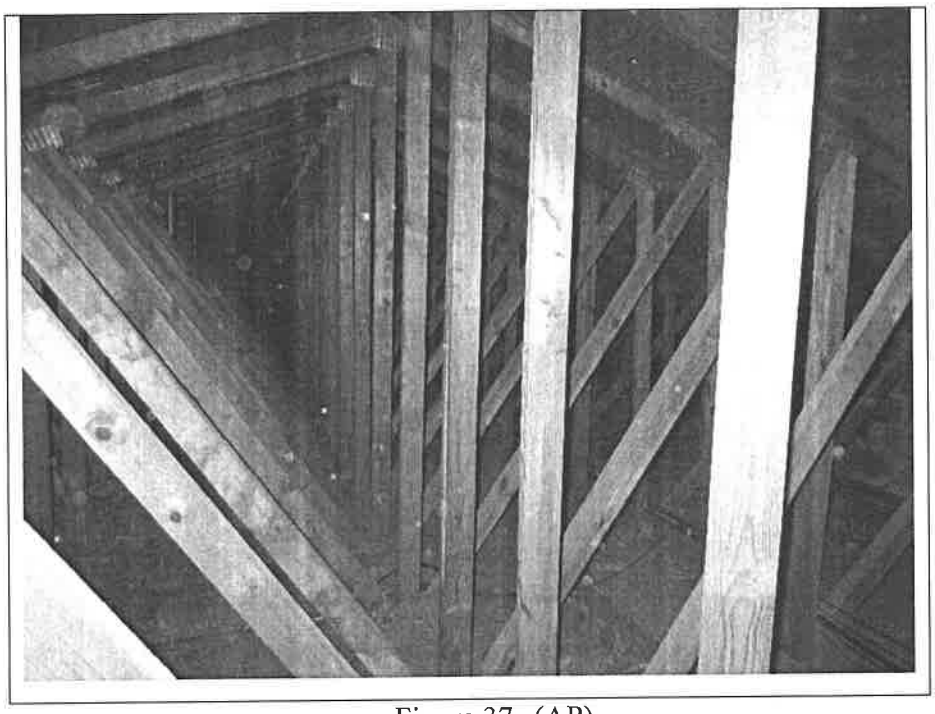

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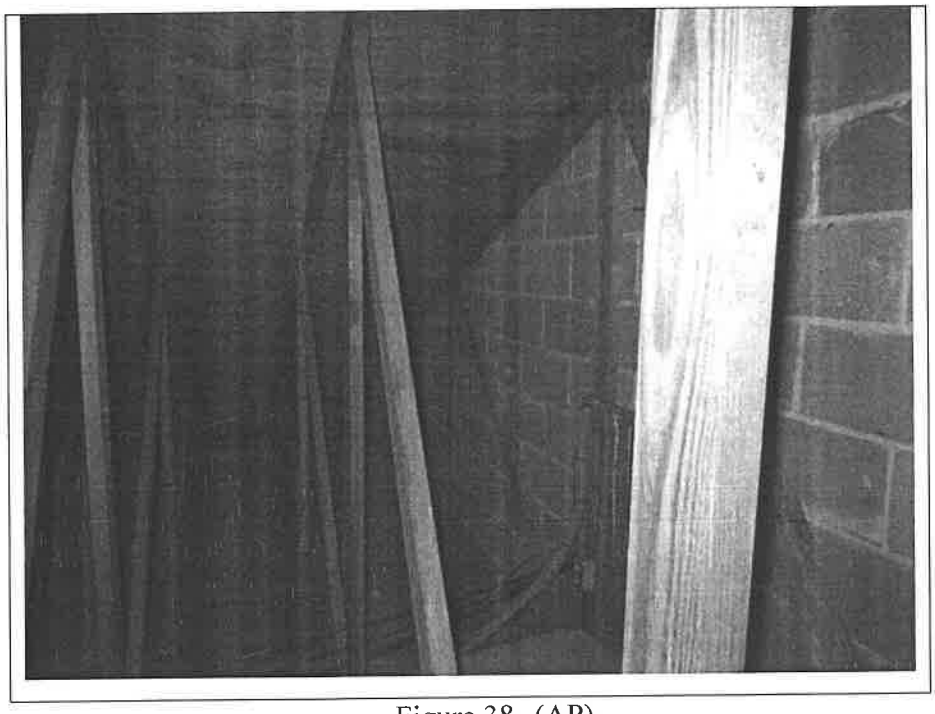

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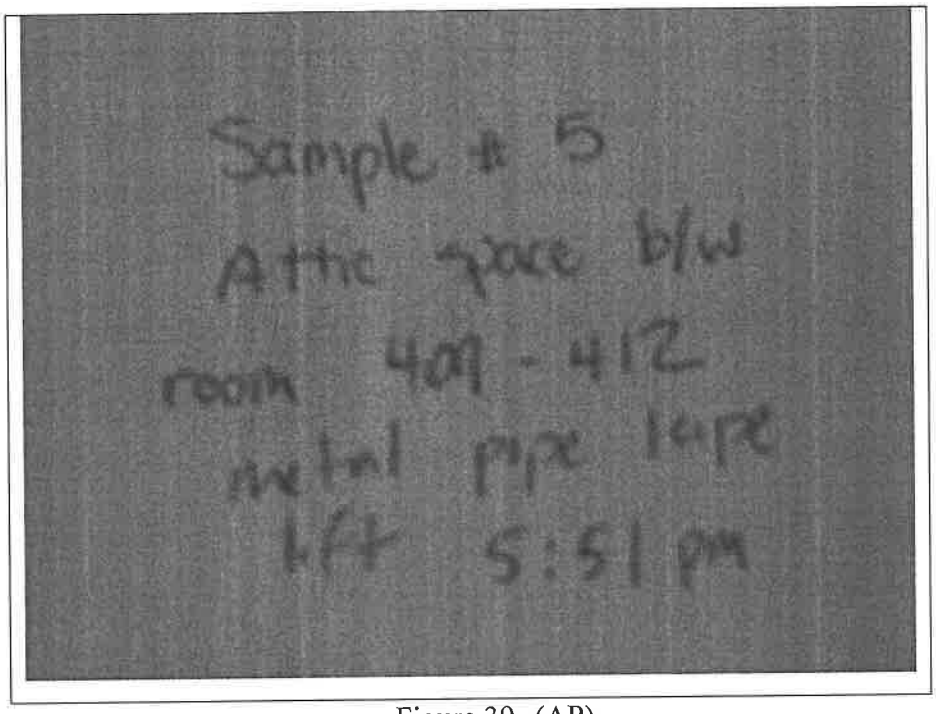

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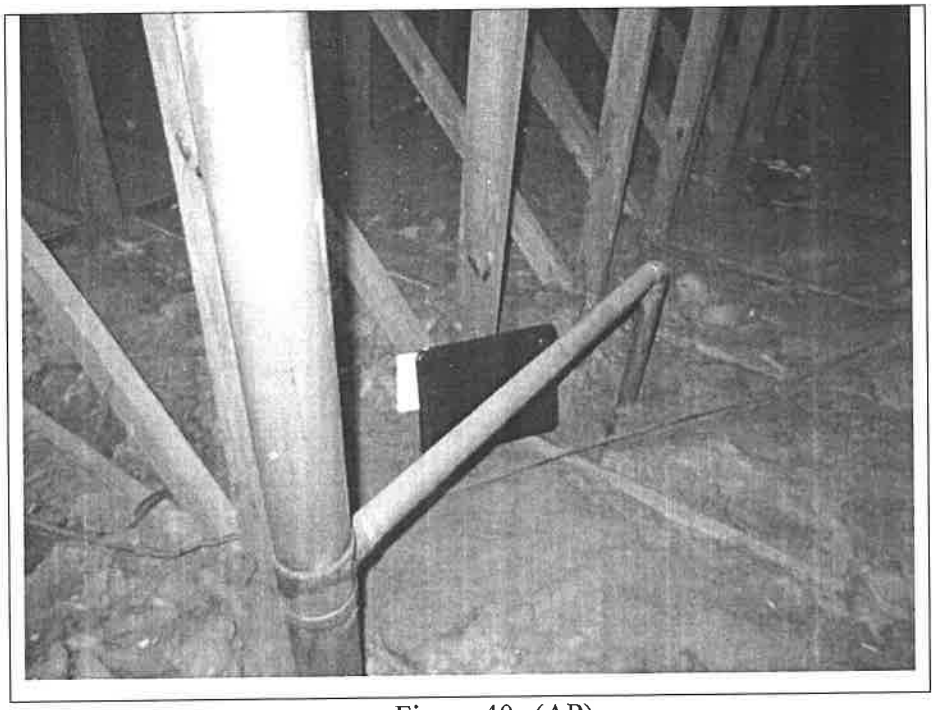

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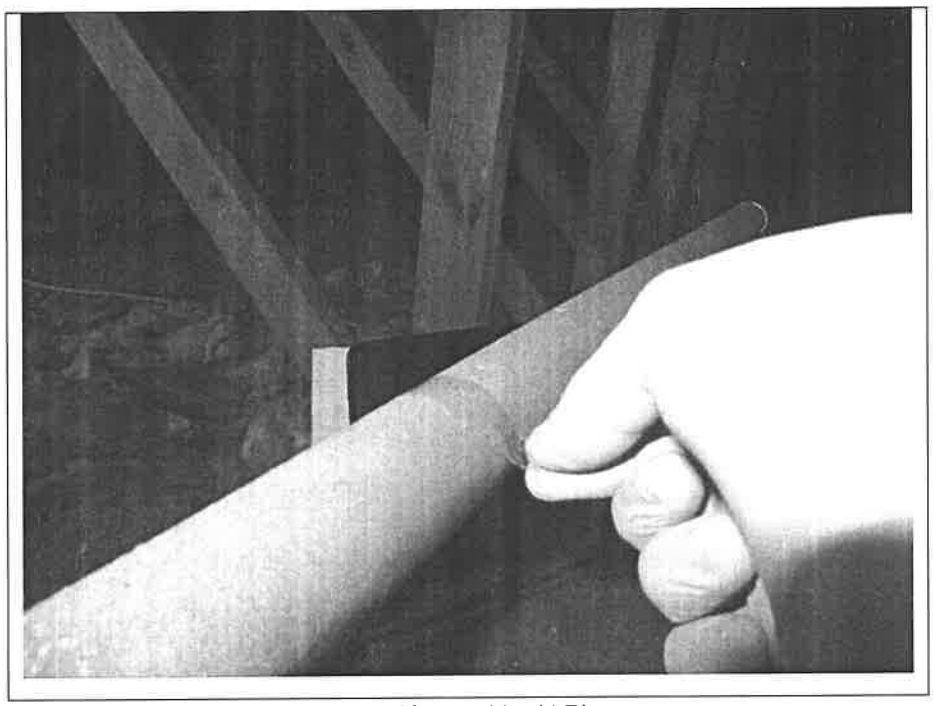
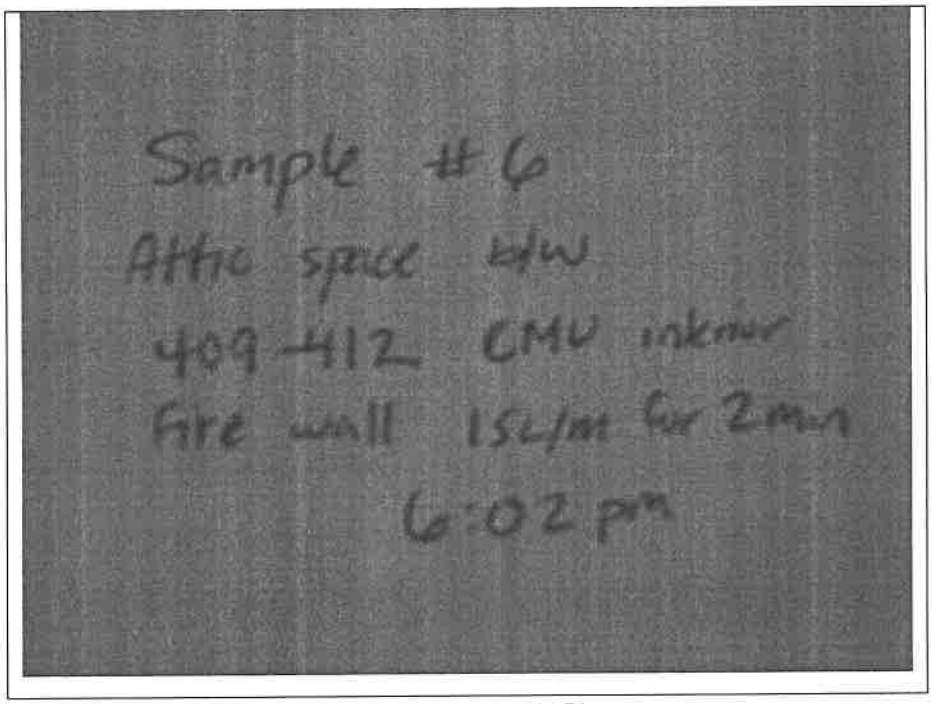


Figure 41. (AP)



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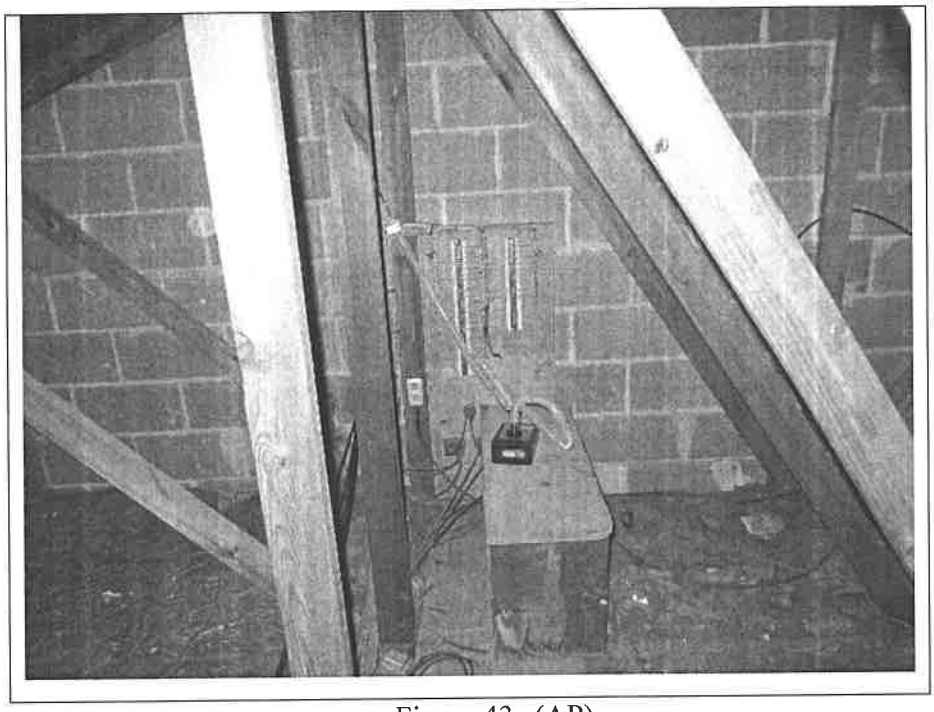

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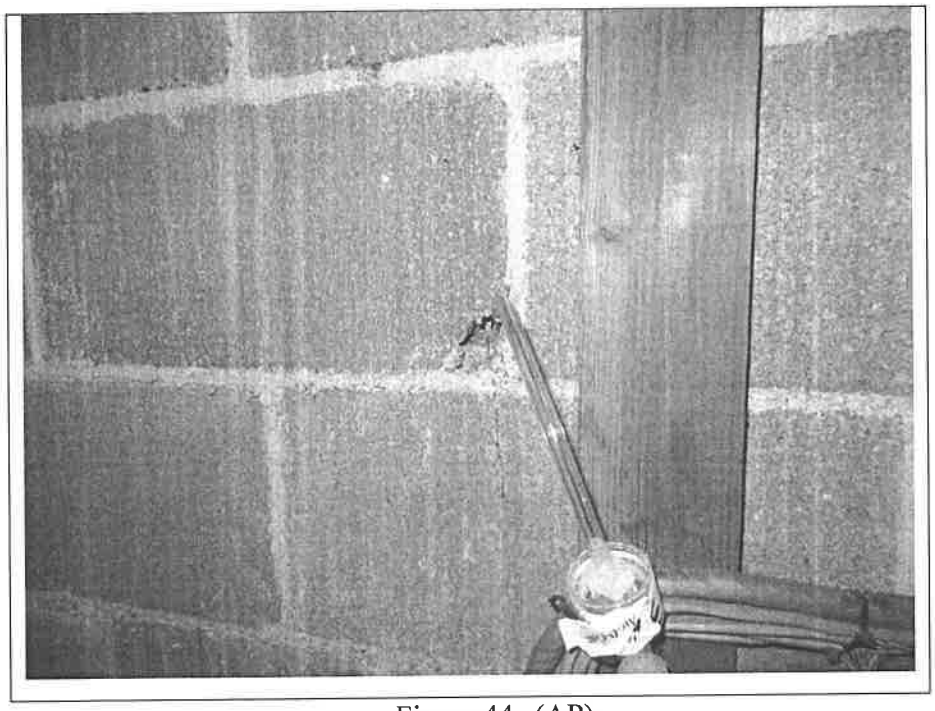
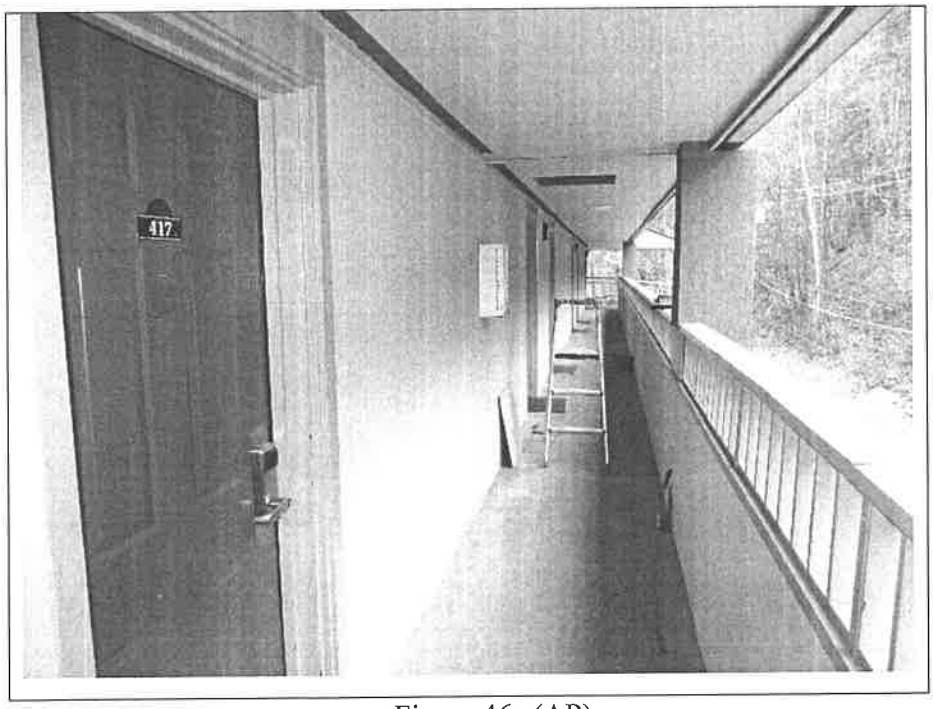


Figure 44. (AP)

Figure 45. (AP)



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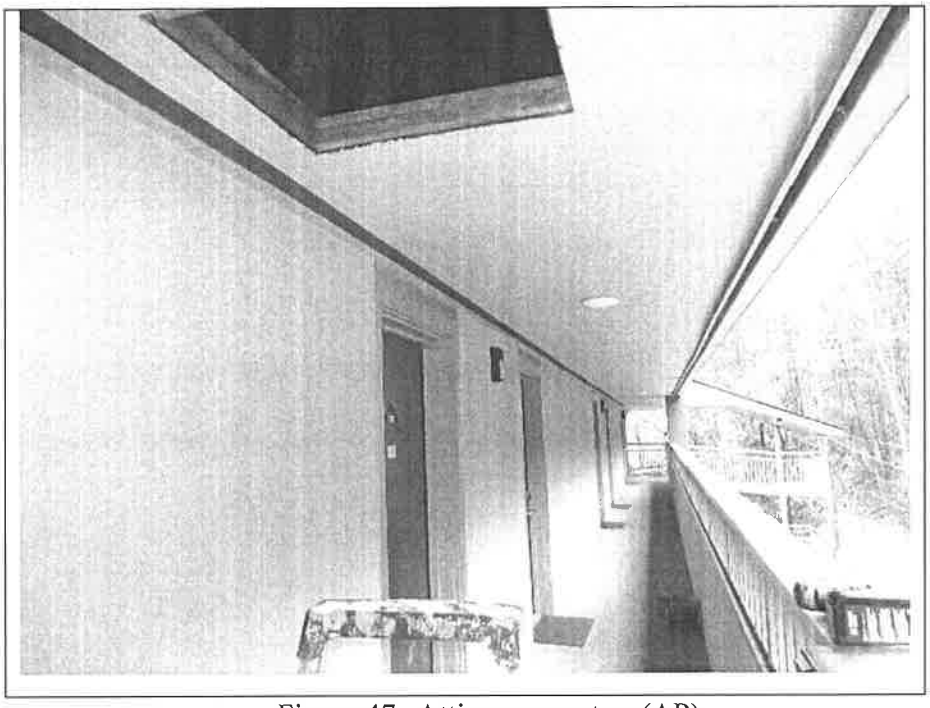


Figure 47. Attic space entry. (AP)

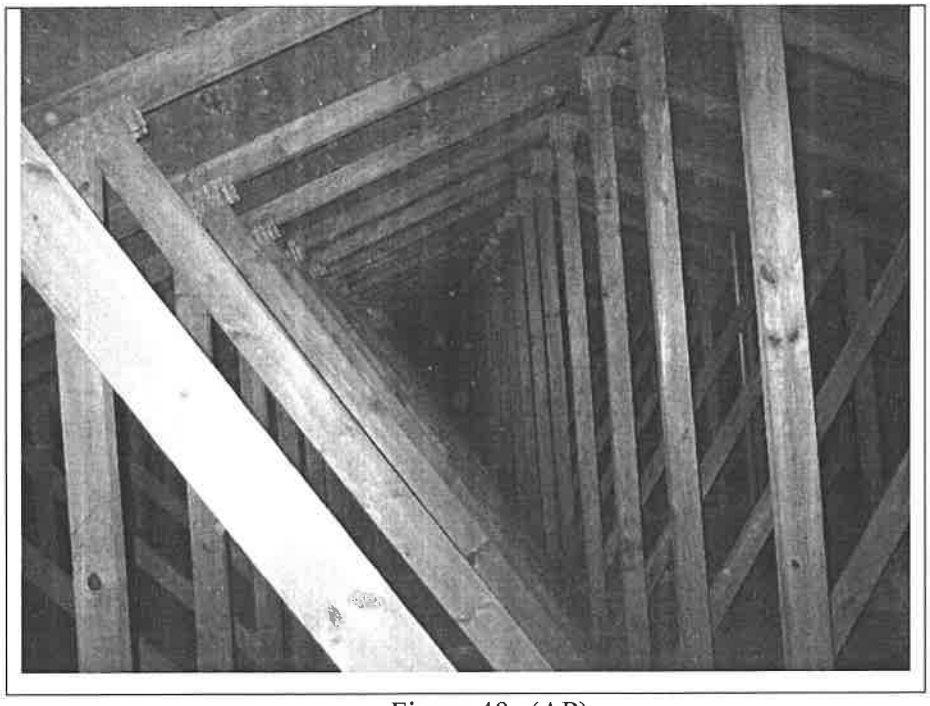


Figure 48. (AP)

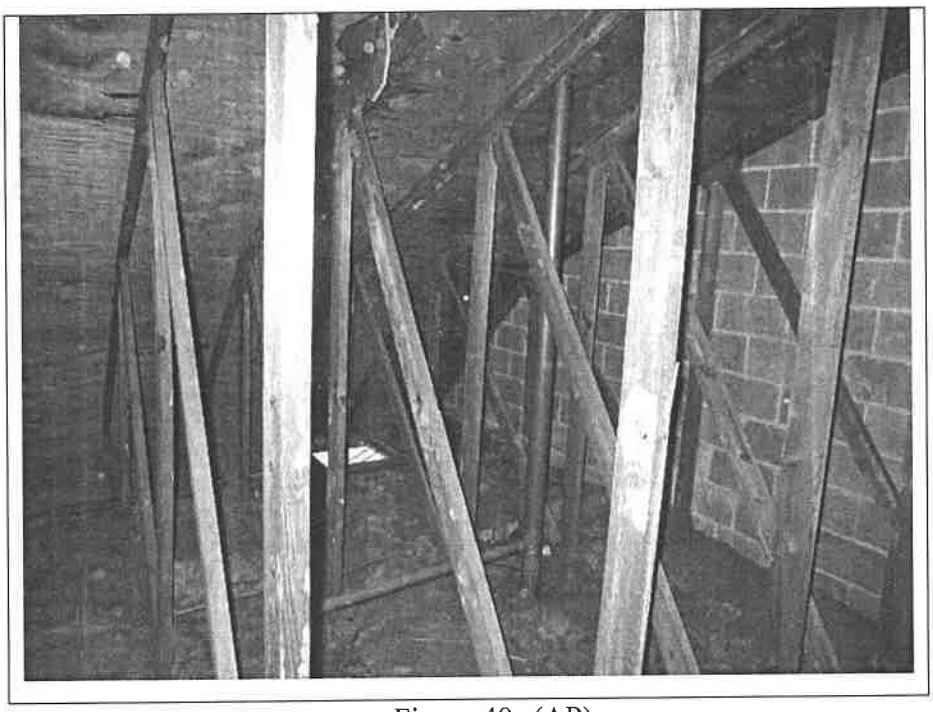


Figure 49. (AP)

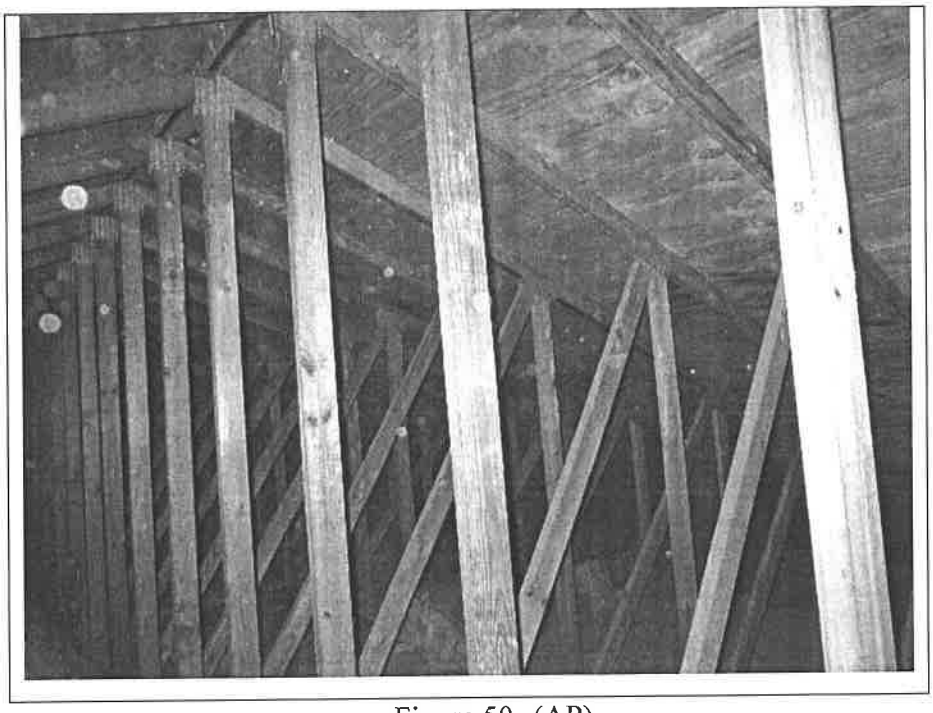


Figure 50. (AP)

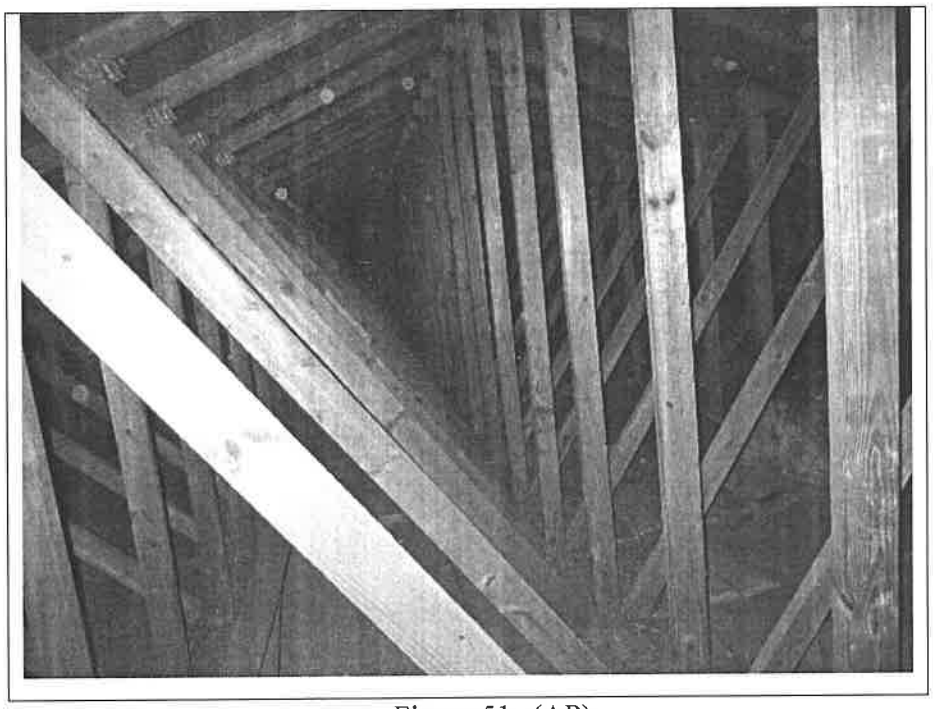


Figure 51. (AP)

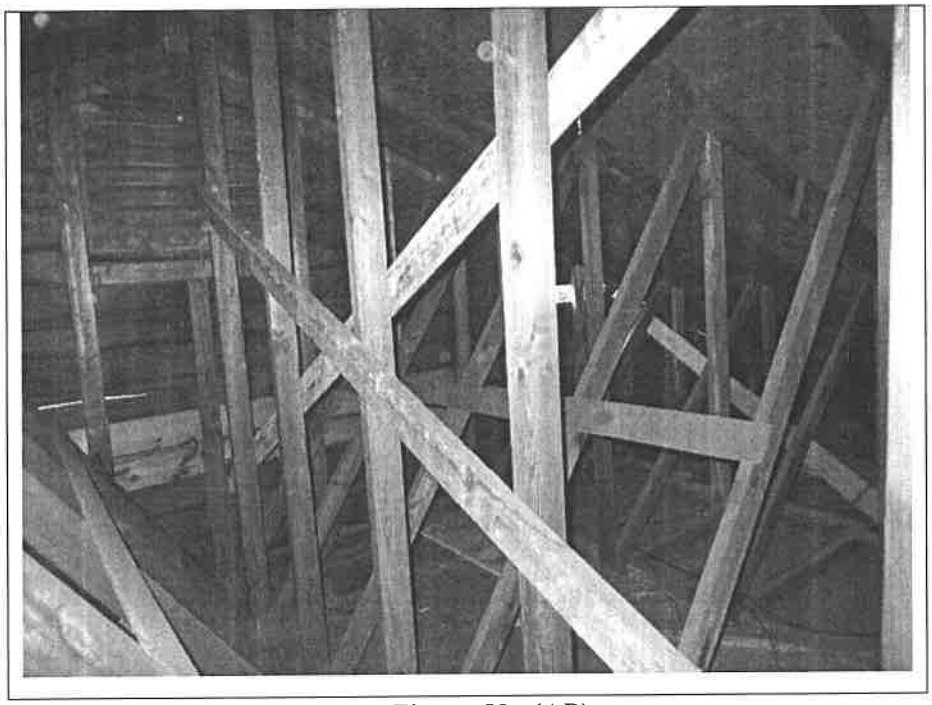
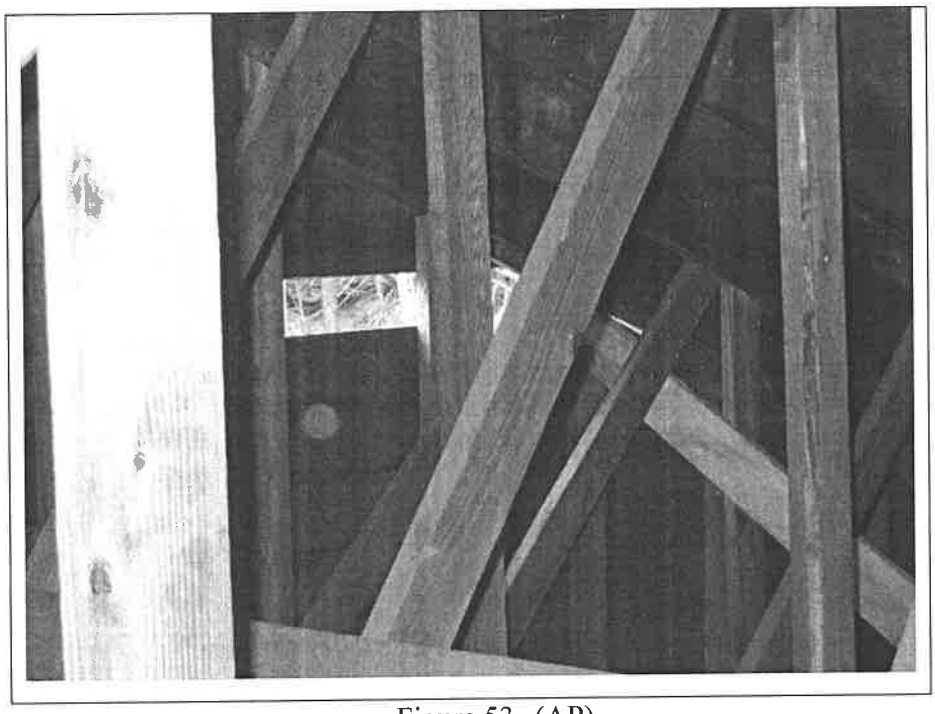


Figure 52. (AP)



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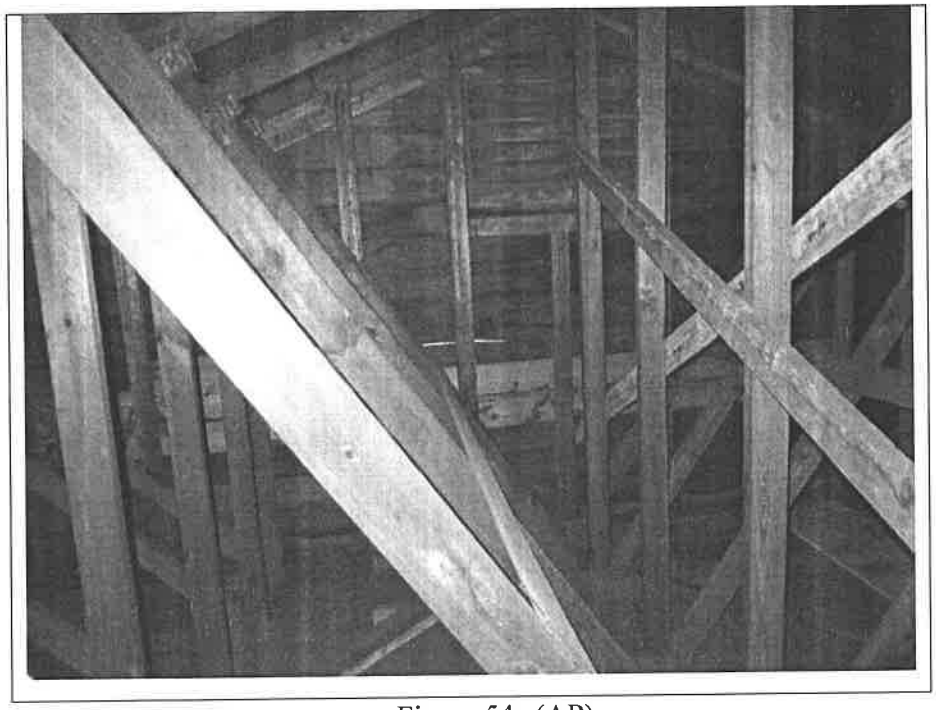

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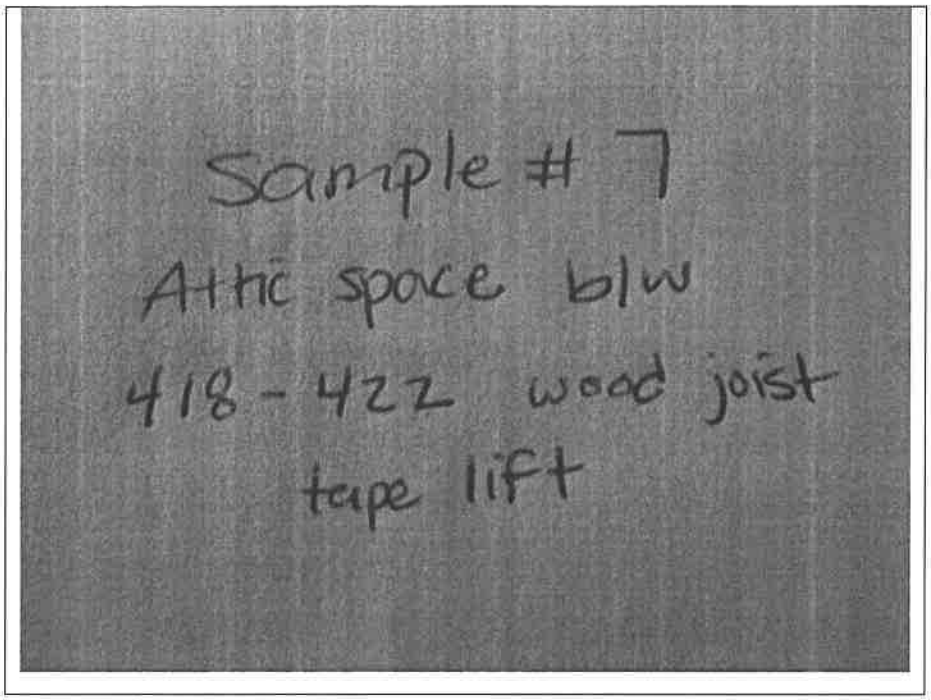
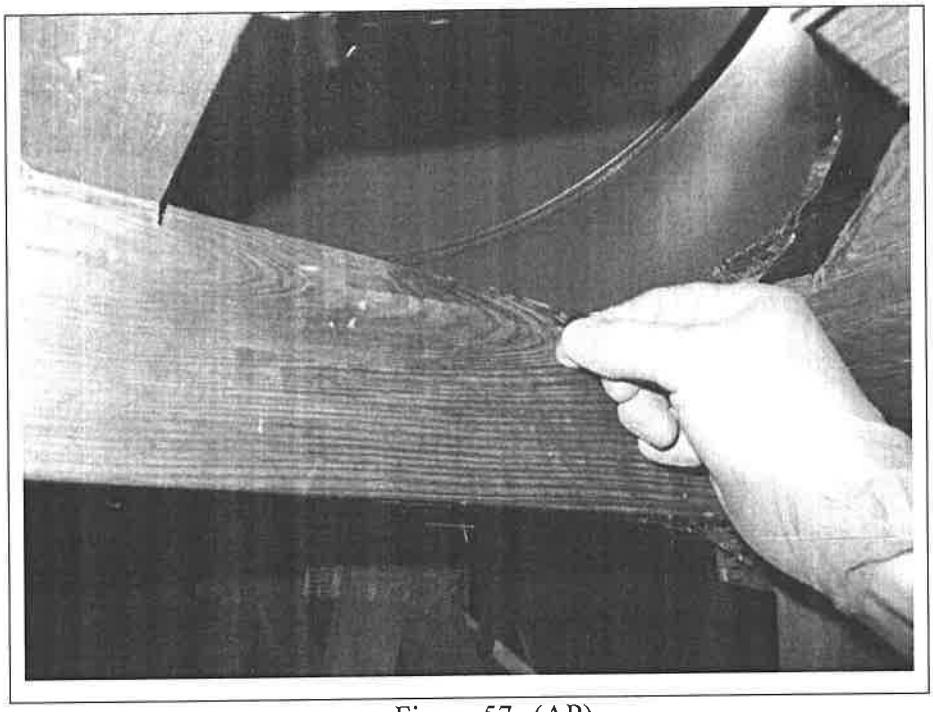


Figure 55. (AP)

Figure 56. (AP)



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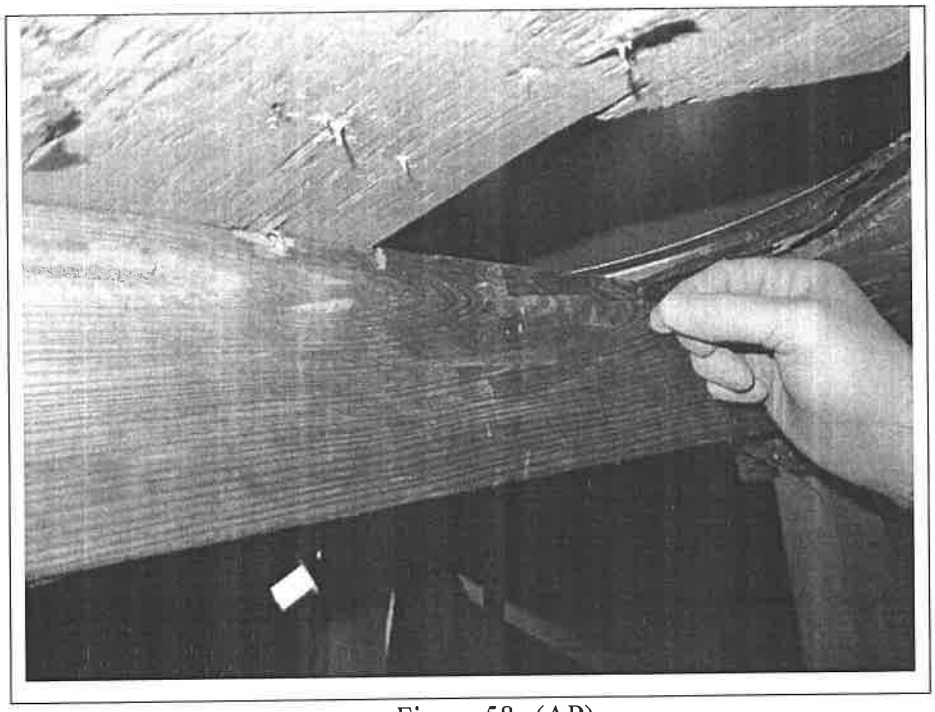

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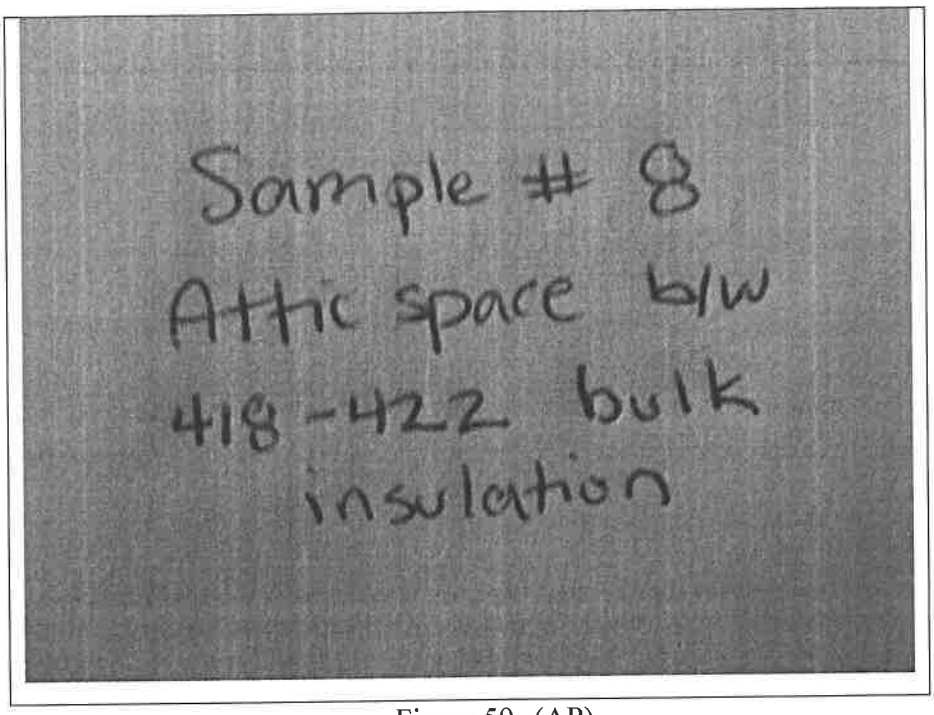

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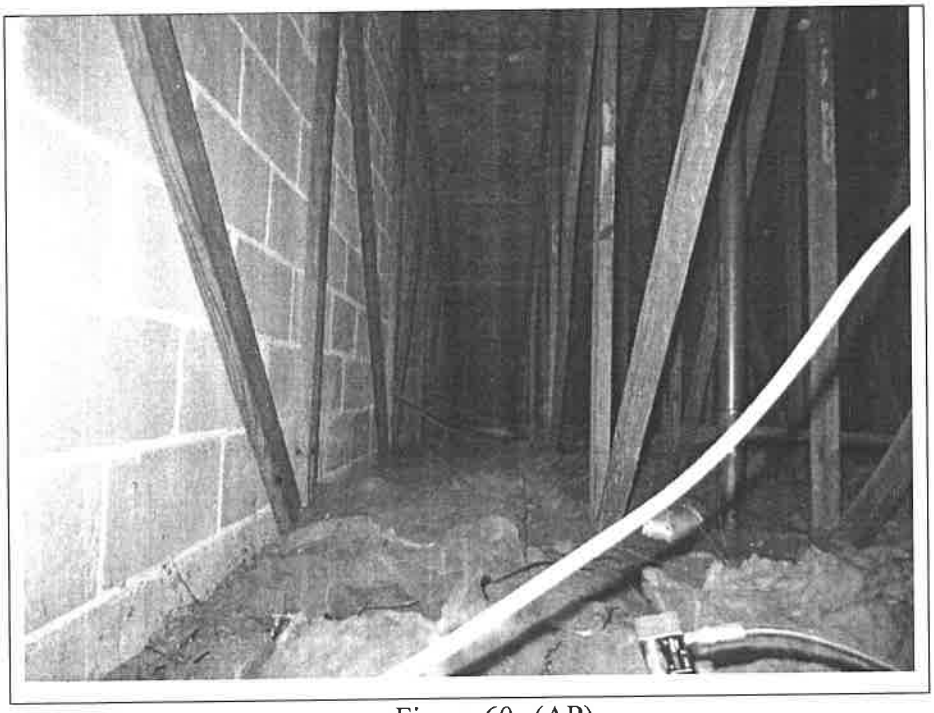

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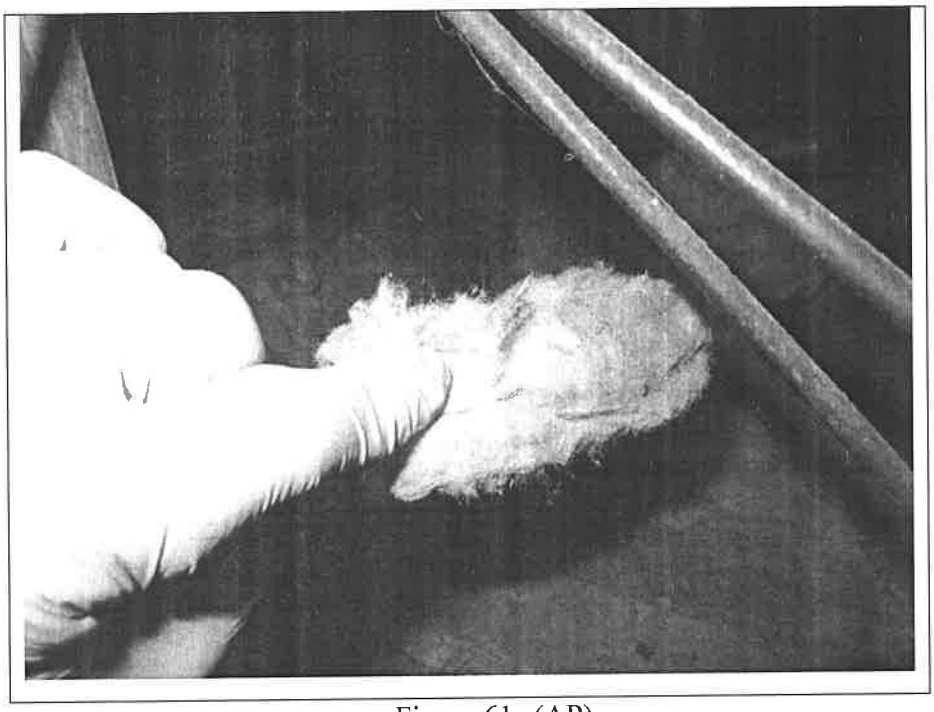


Figure 61. (AP)

Figure 62. (AP)

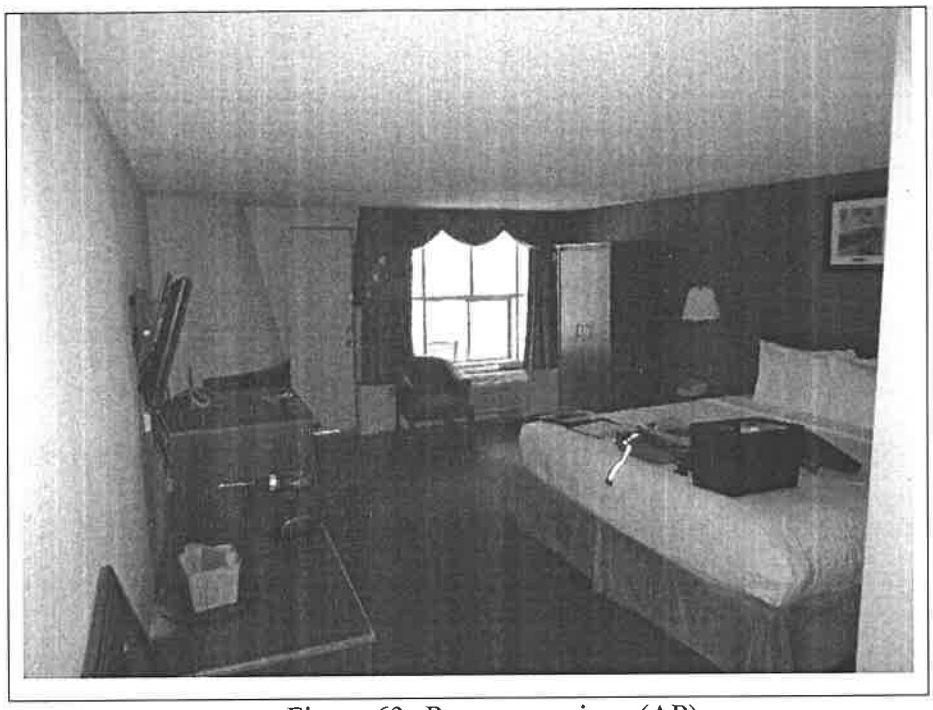
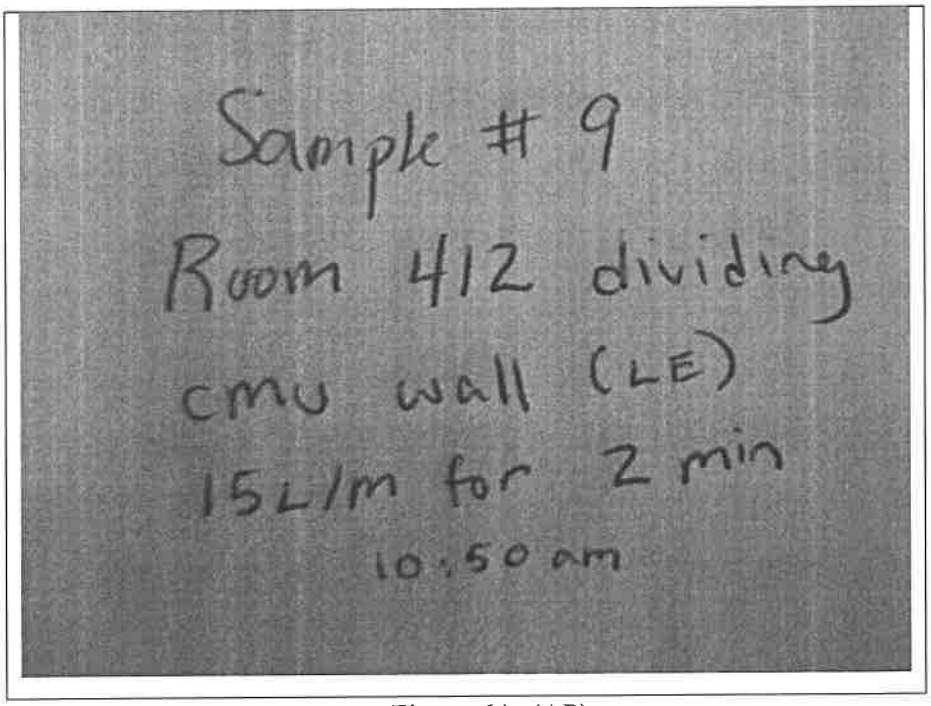


Figure 63. Room overview. (AP)



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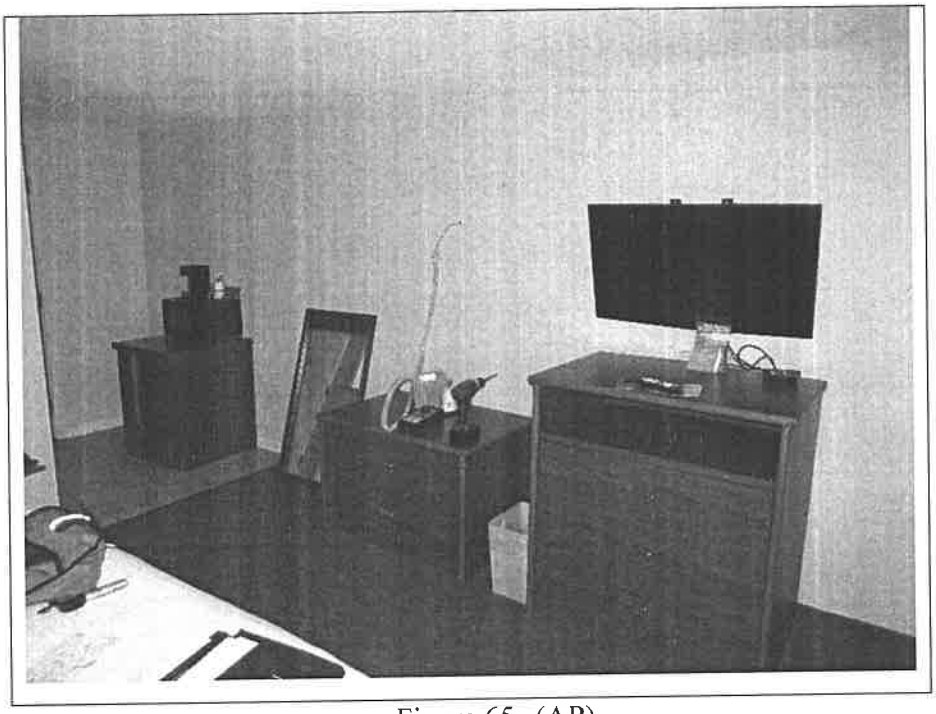

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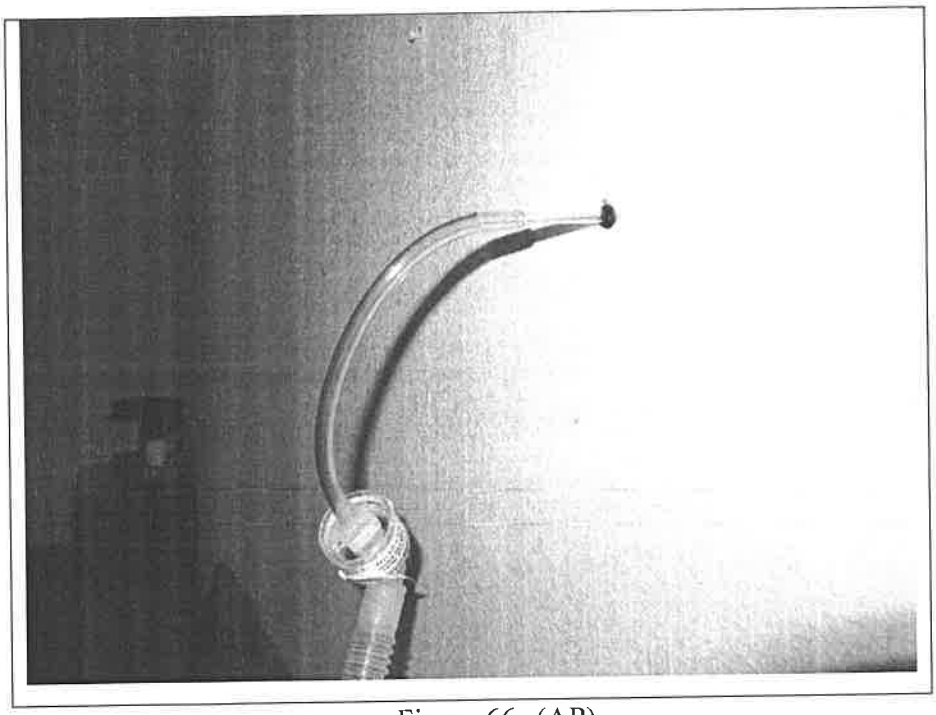

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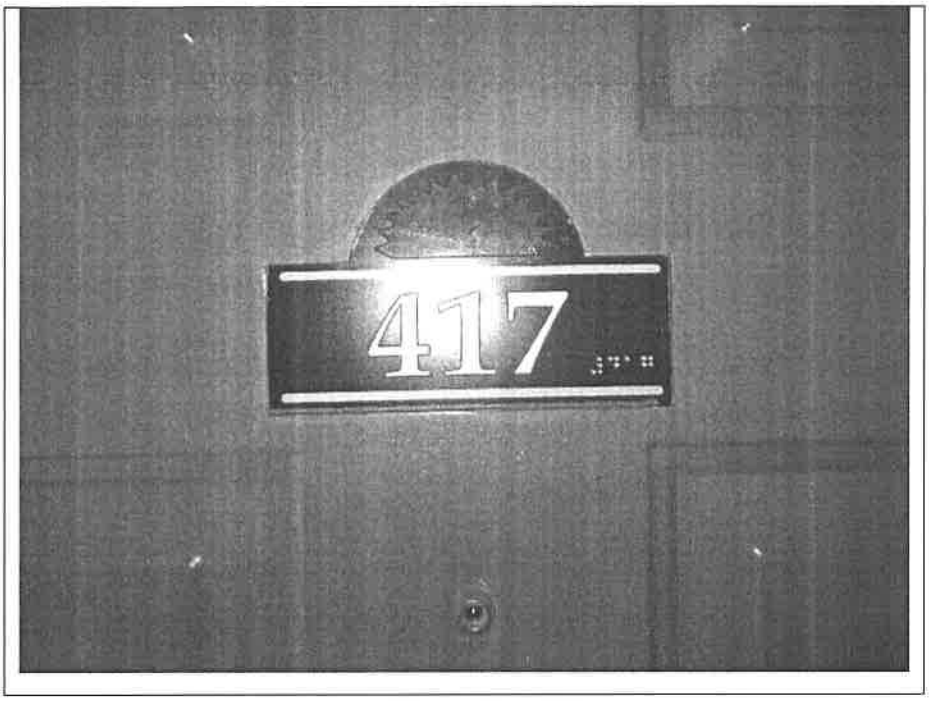

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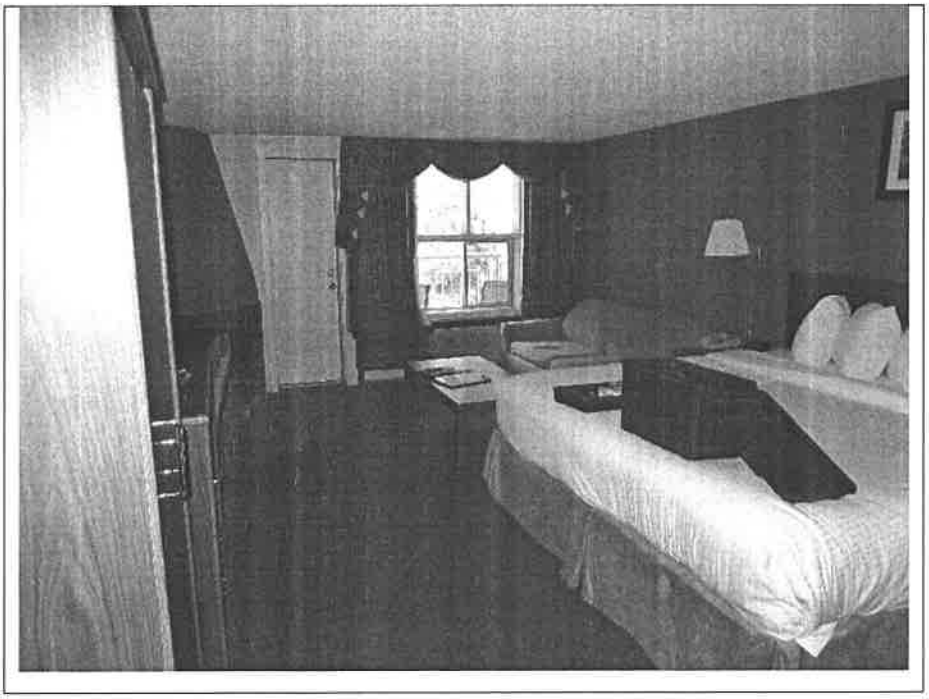


Figure 68. Room overview. (AP)

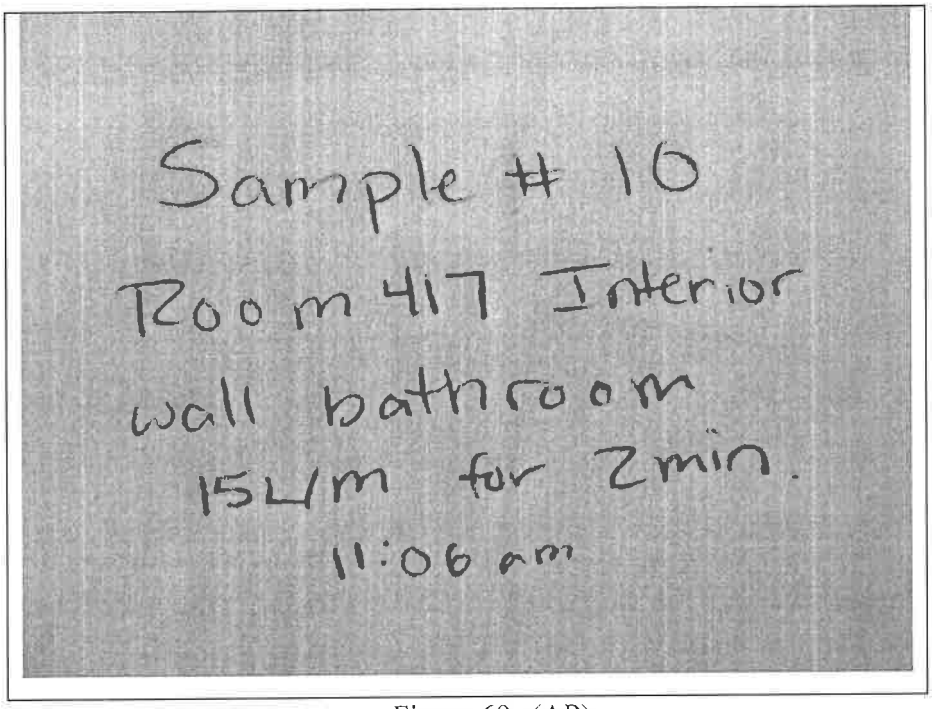


Figure 69. (AP)

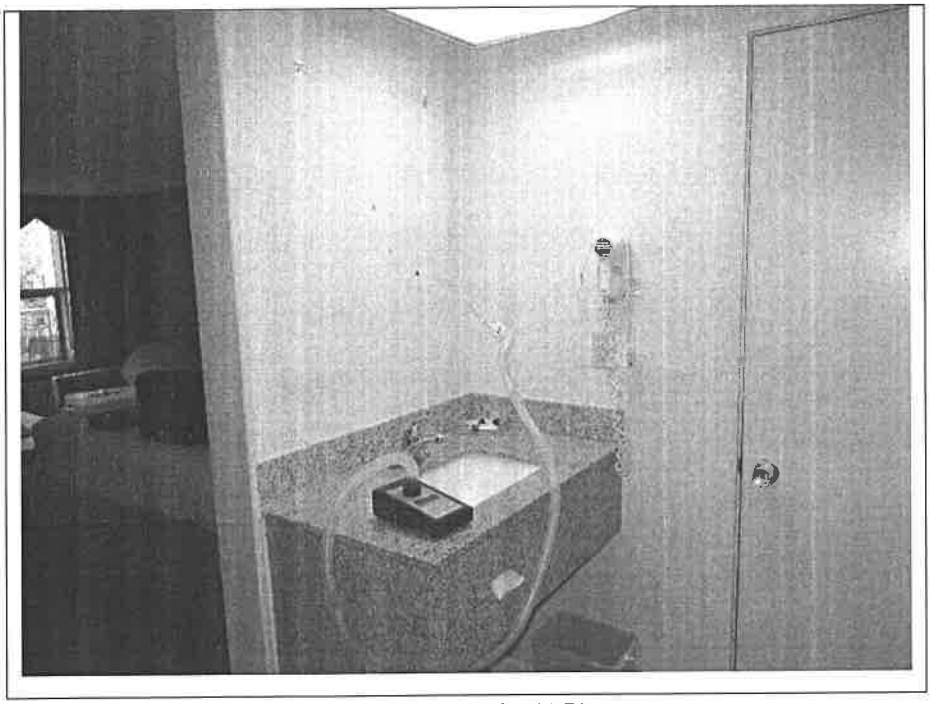


Figure 70. (AP)

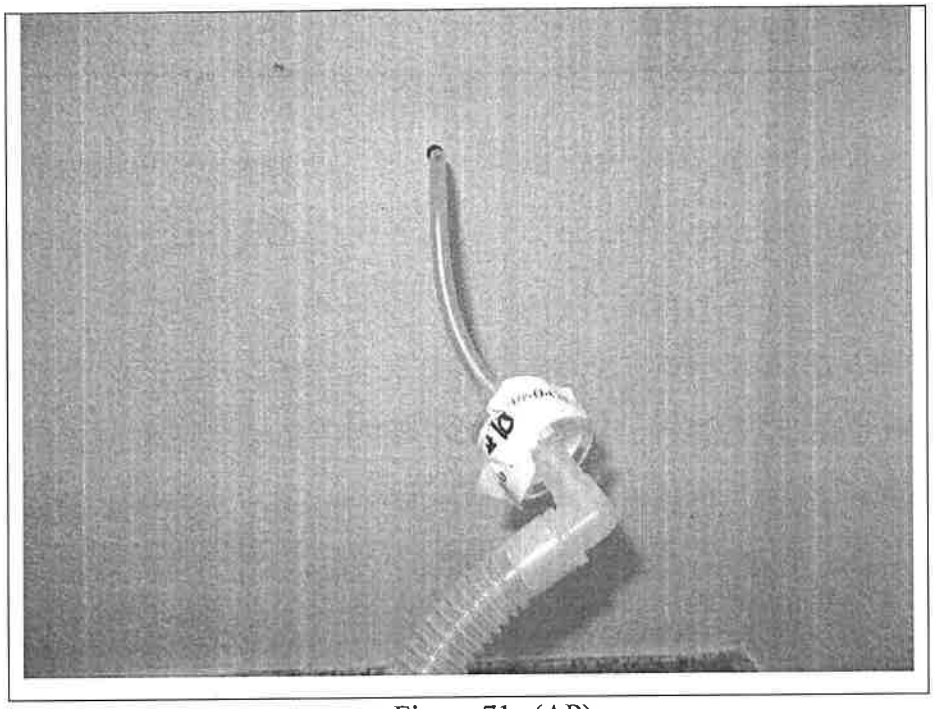


Figure 71. (AP)

Figure 72. (AP)

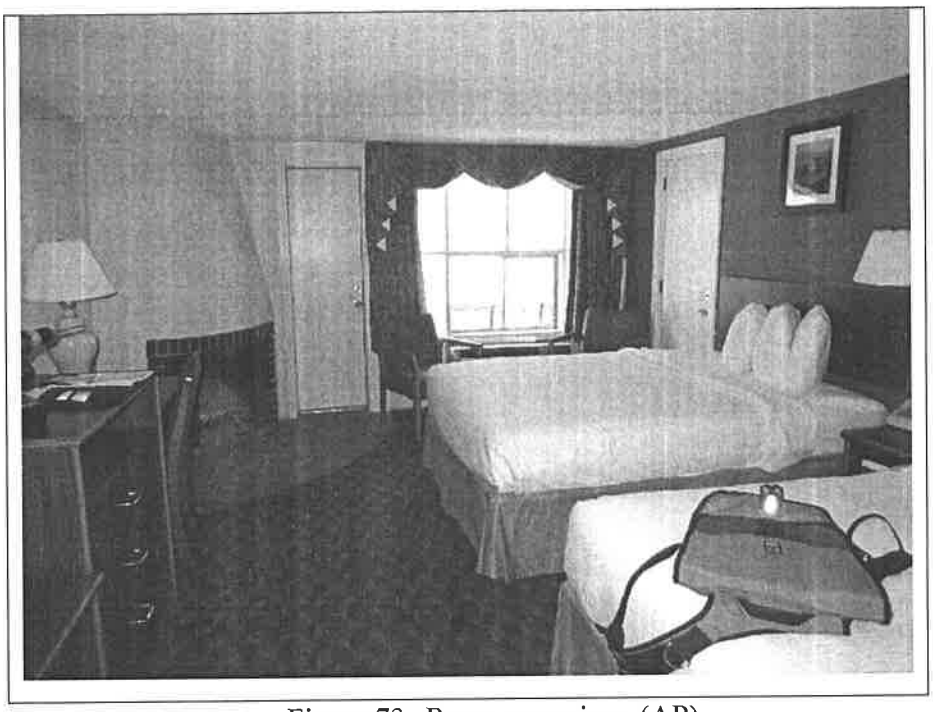
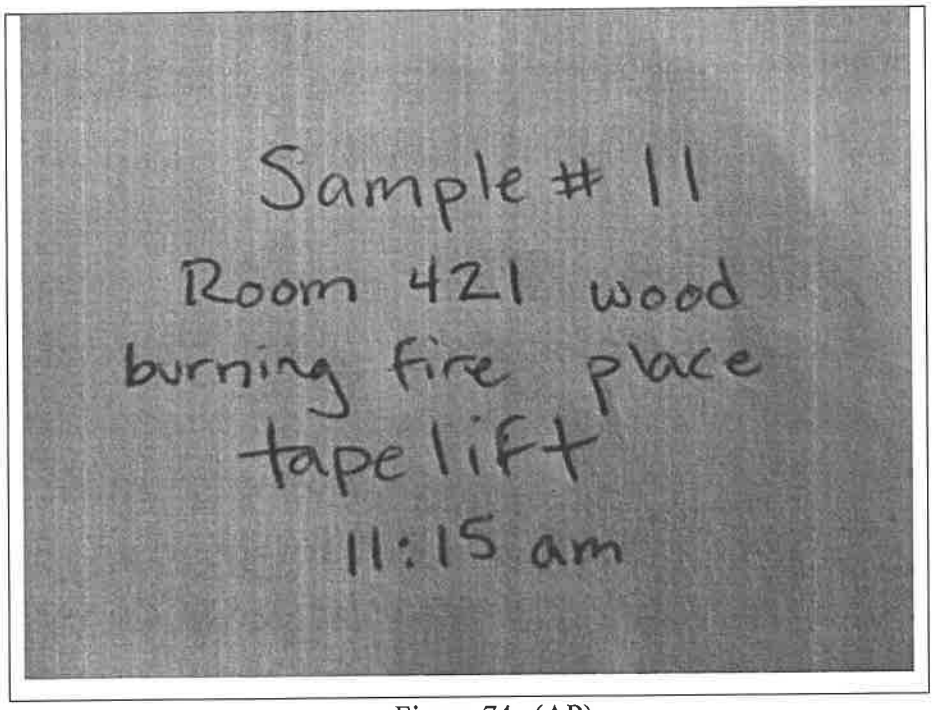


Figure 73. Room overview. (AP)



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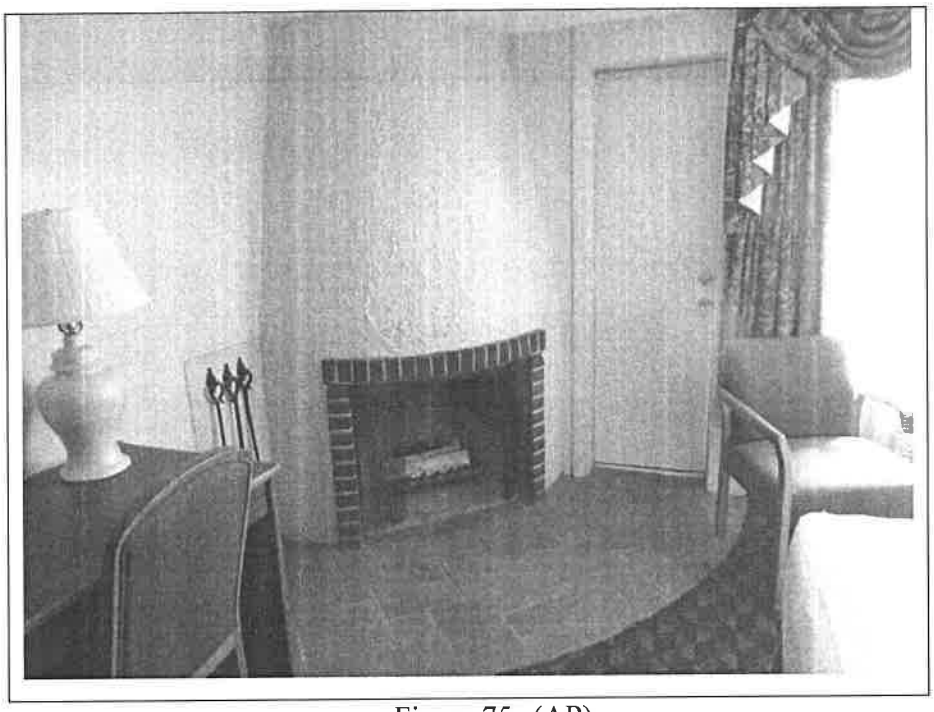

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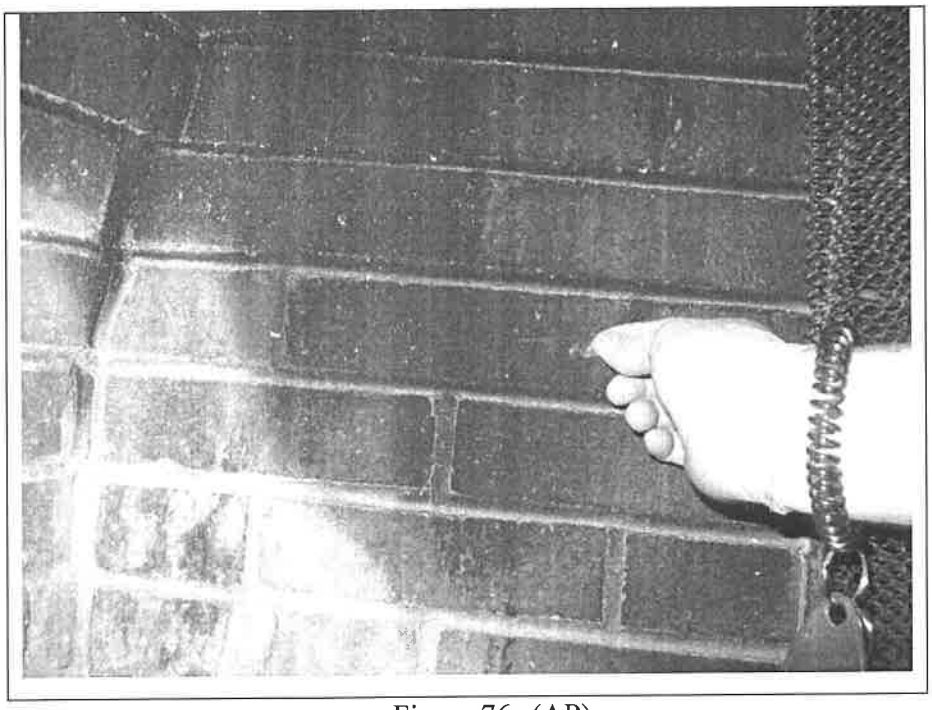

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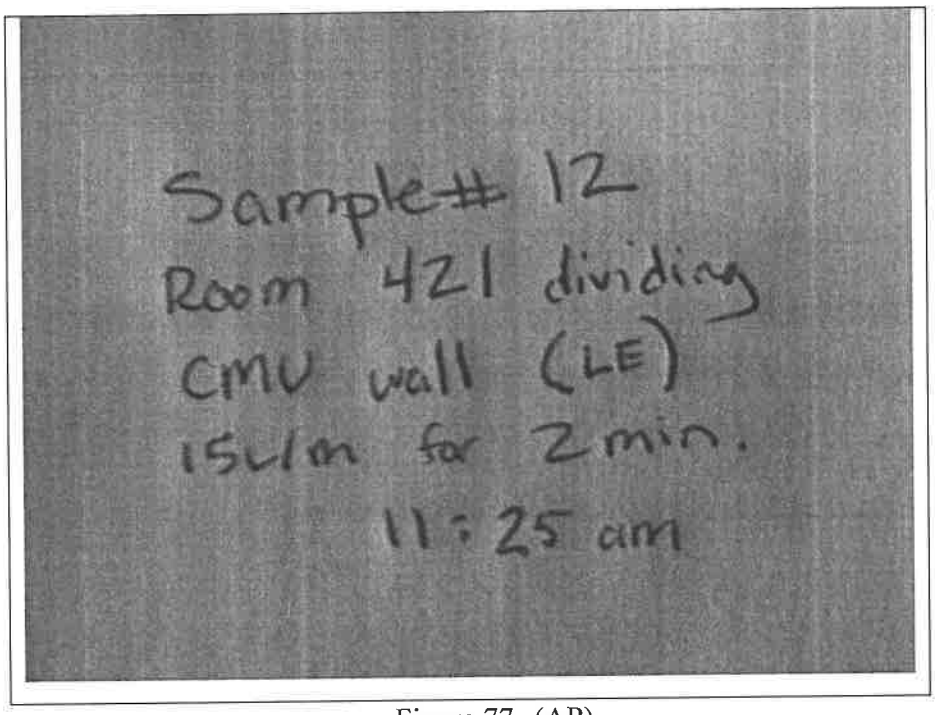

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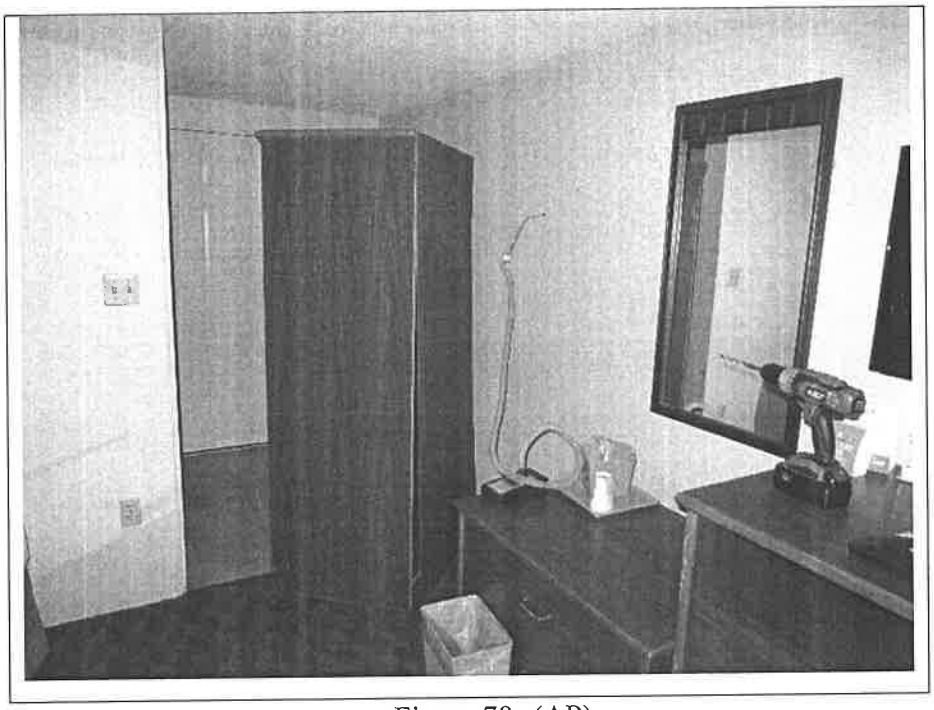

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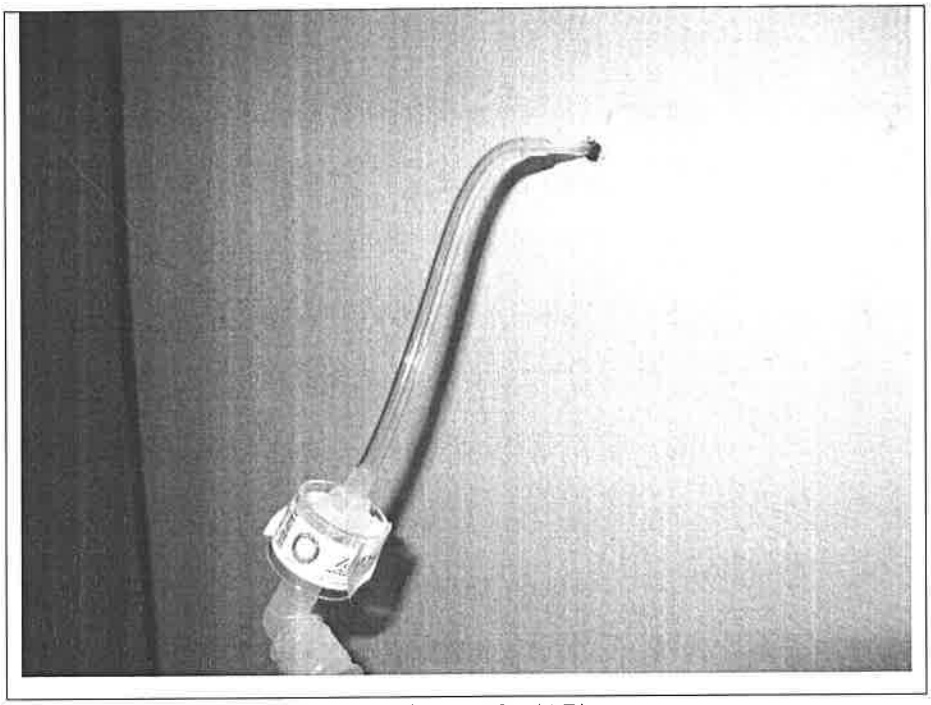


Figure 79. (AP)

Figure 80. (AP)

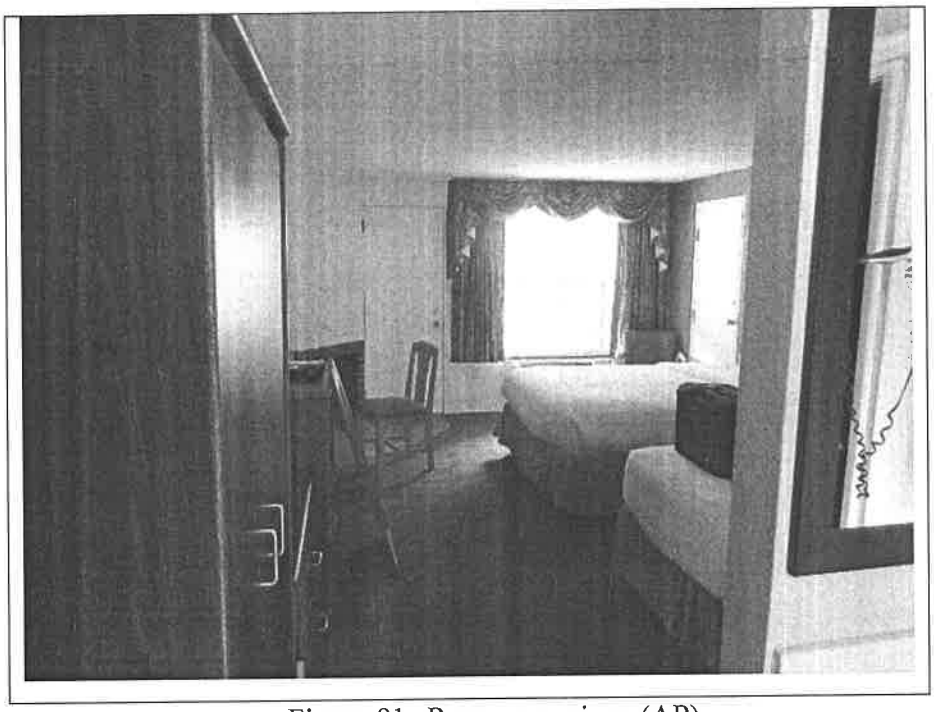
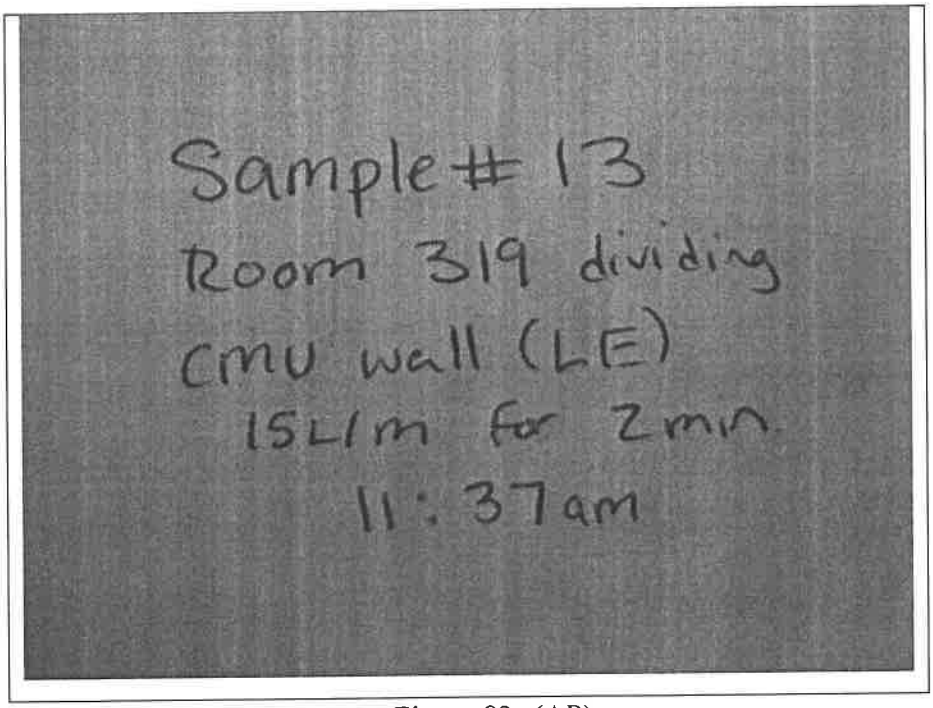


Figure 81. Room overview. (AP)



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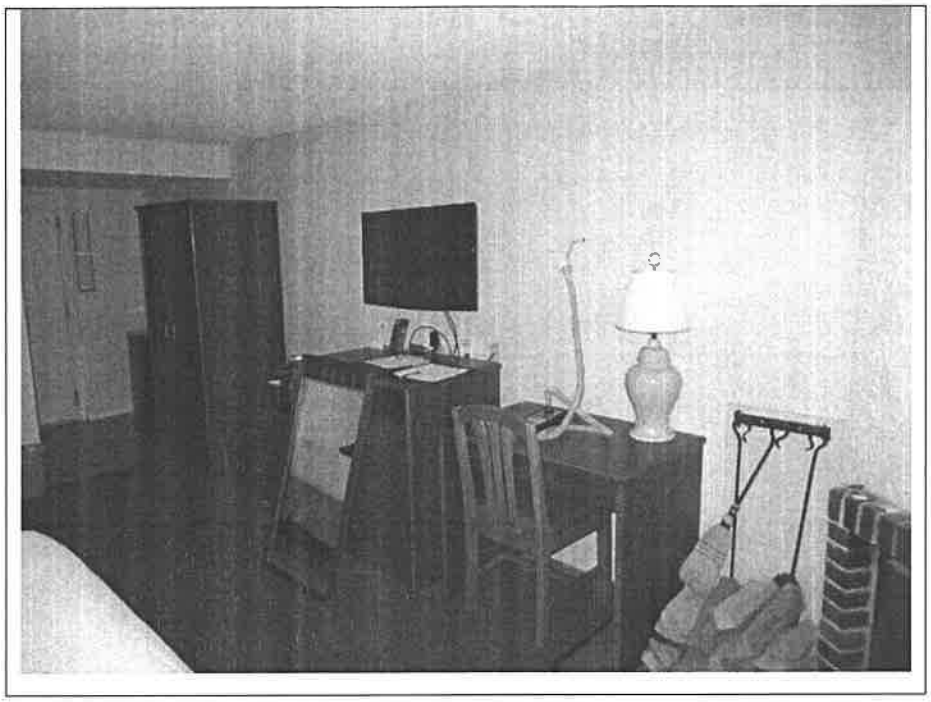

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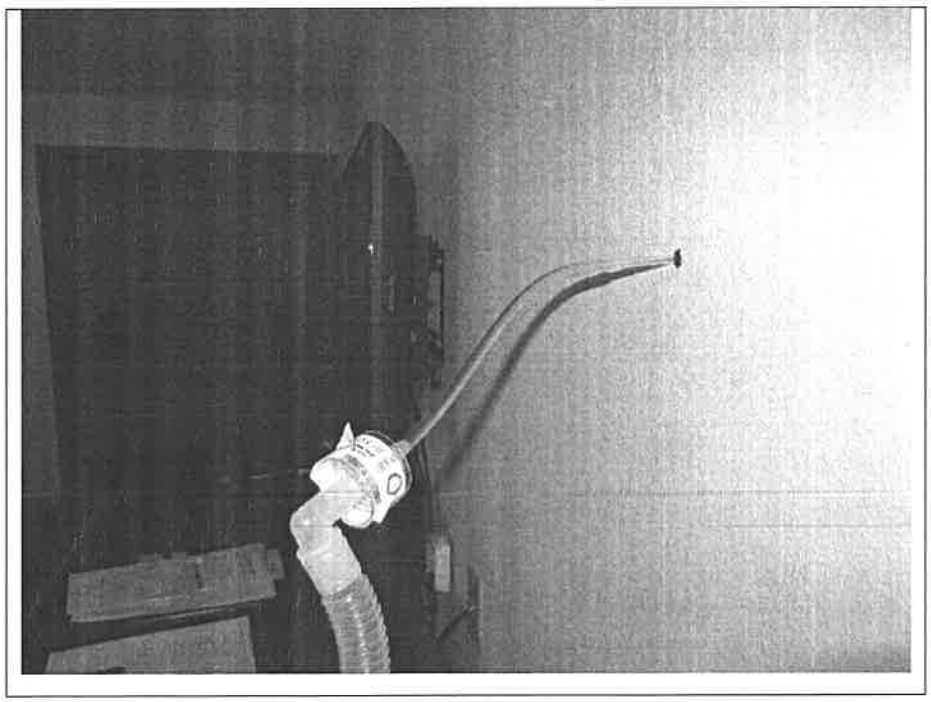


Figure 84. (AP)

Figure 85. (AP)

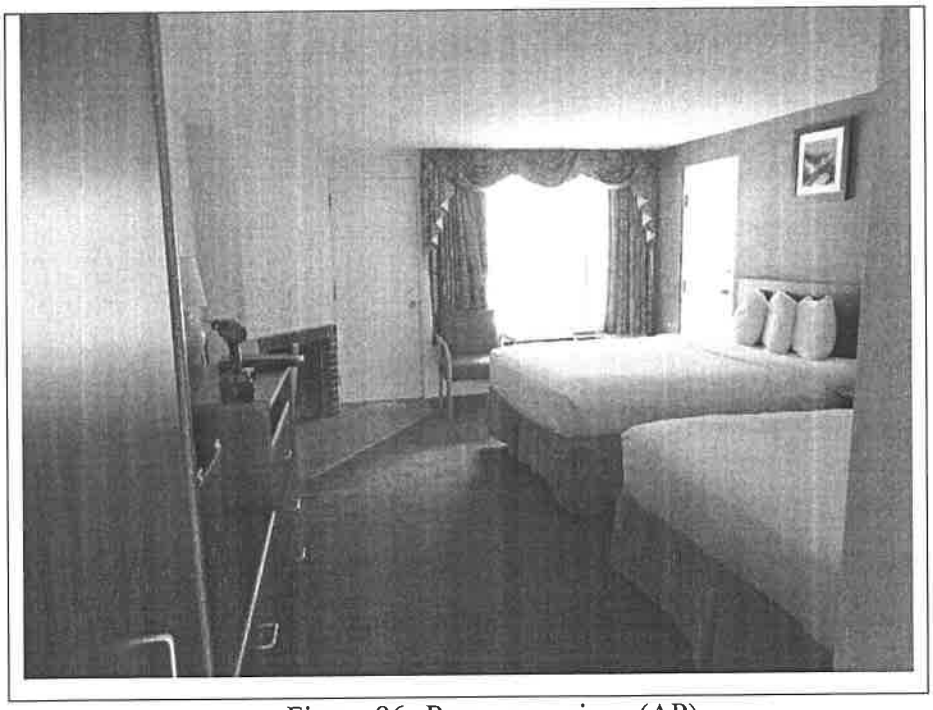


Figure 86. Room overview. (AP)

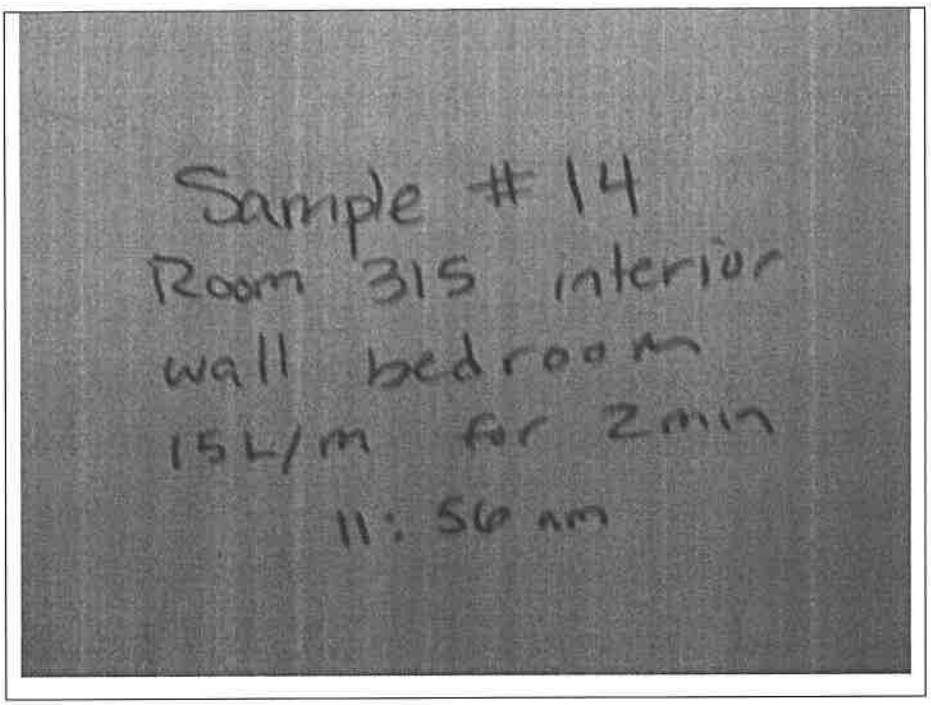


Figure 87. (AP)

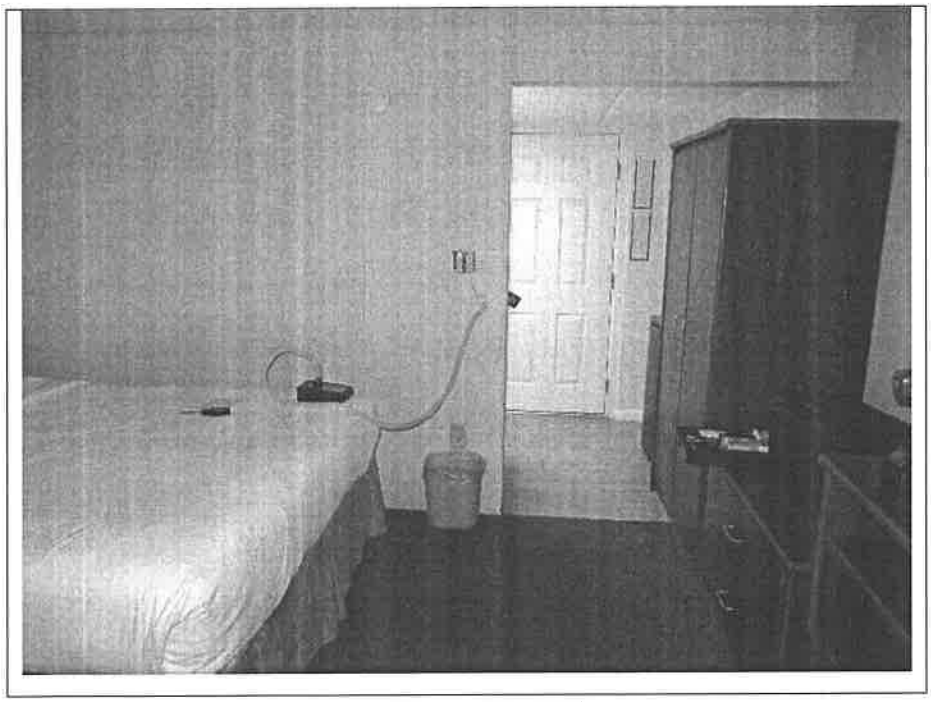


Figure 88. (AP)

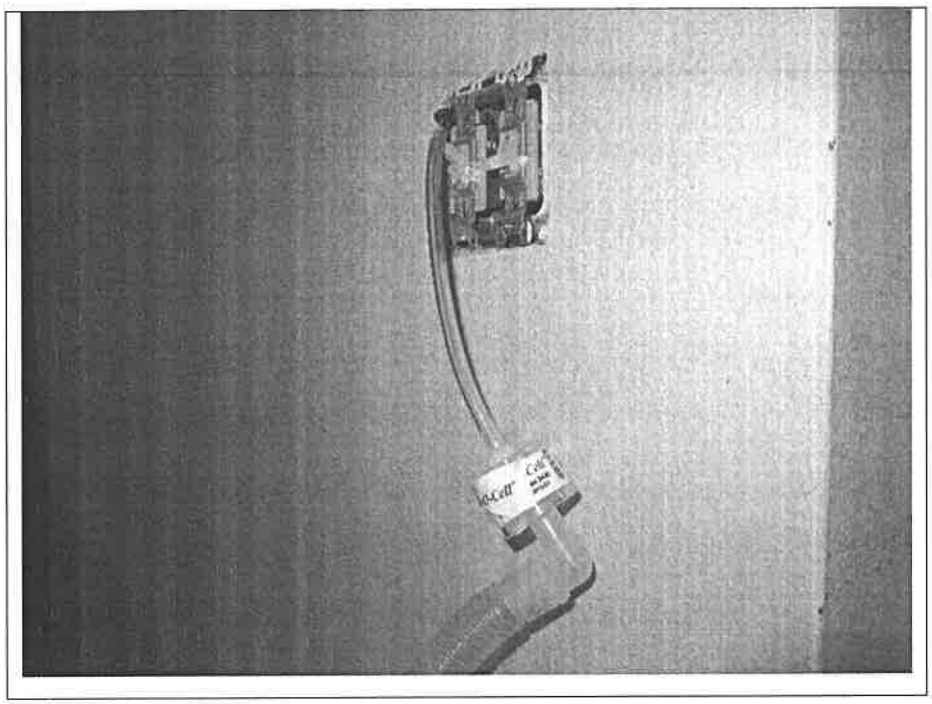


Figure 89. (AP)

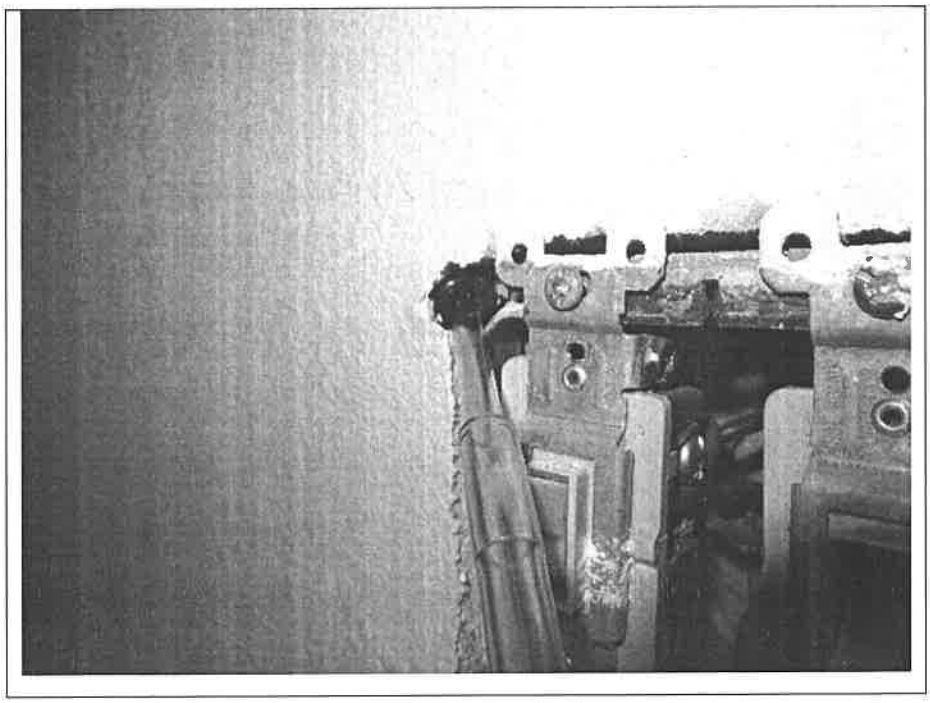


Figure 90. (AP)

Figure 91. (AP)

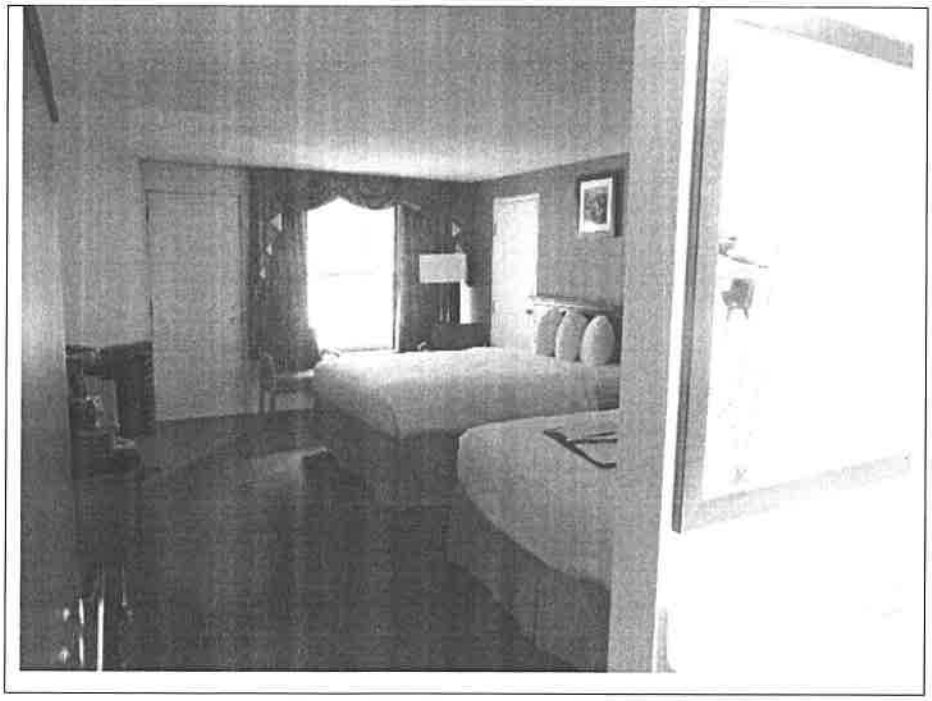


Figure 92. Room overview. (AP)

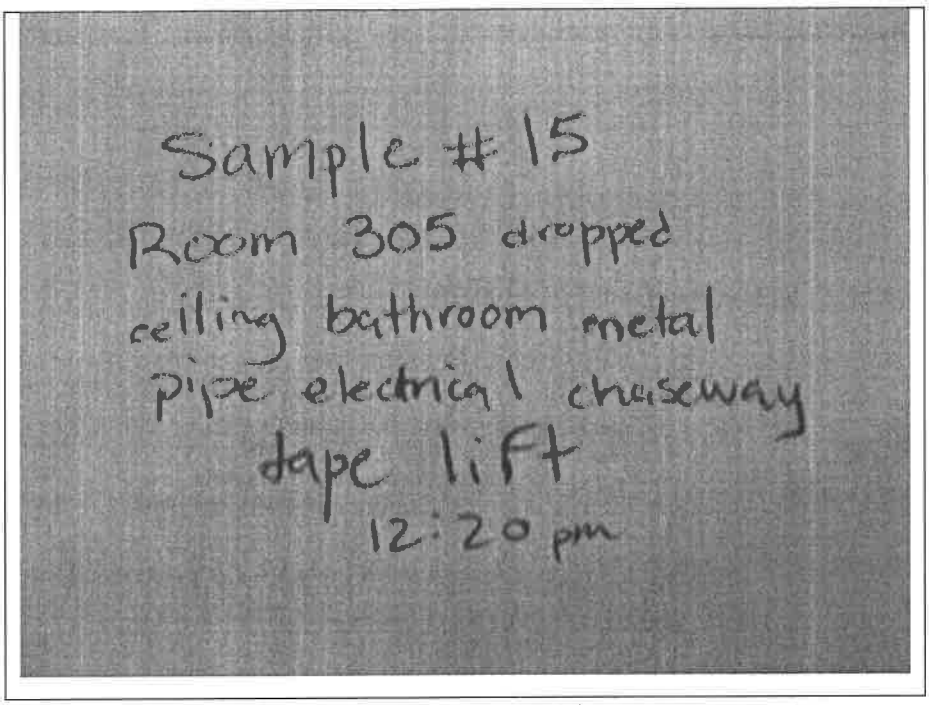


Figure 93. (AP)

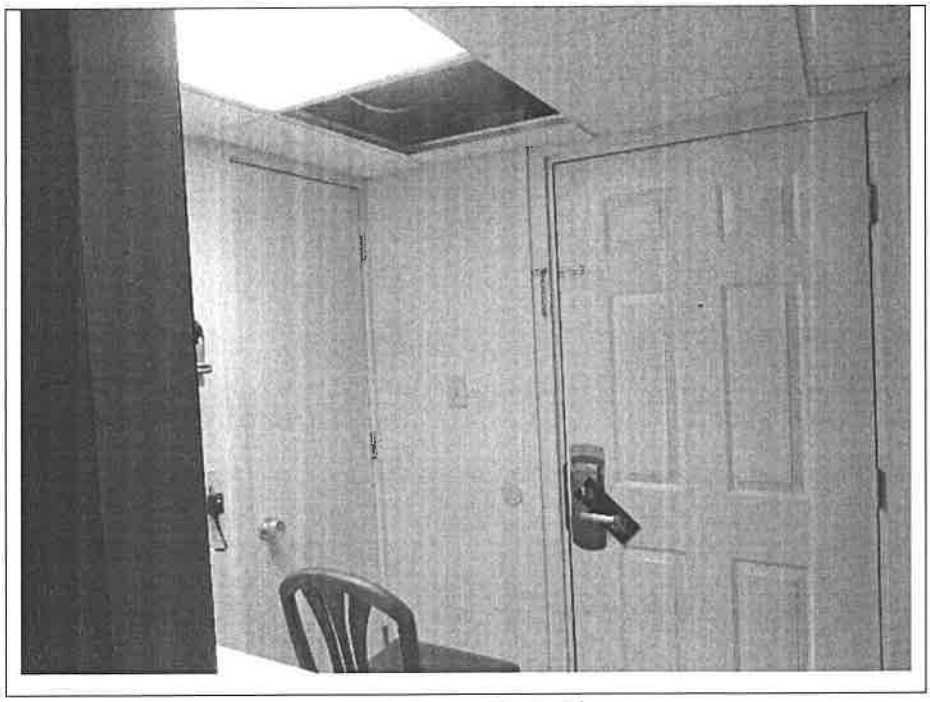
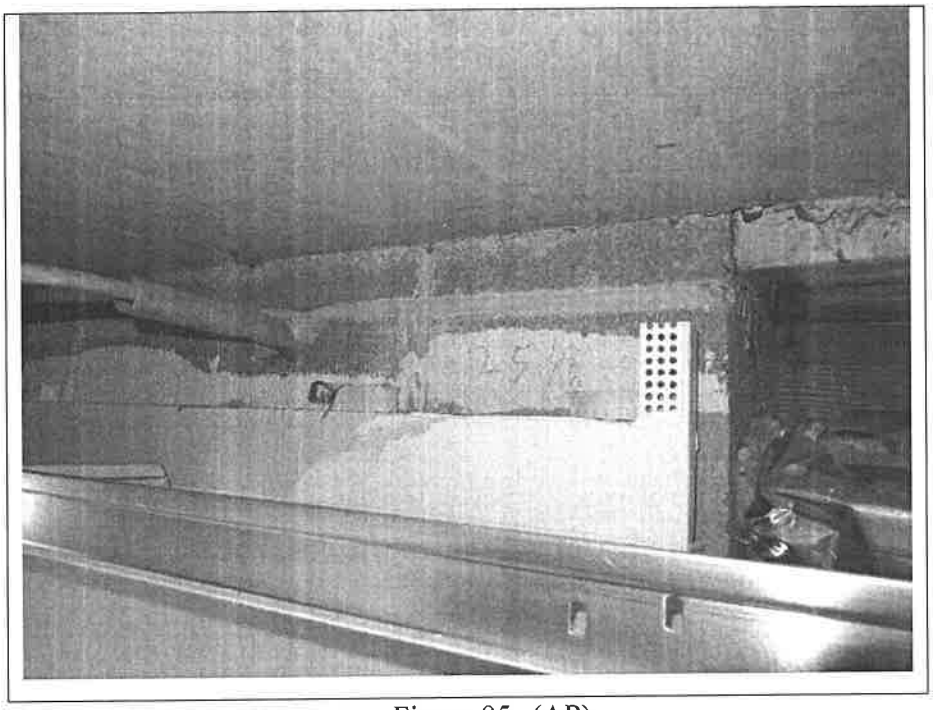


Figure 94. (AP)



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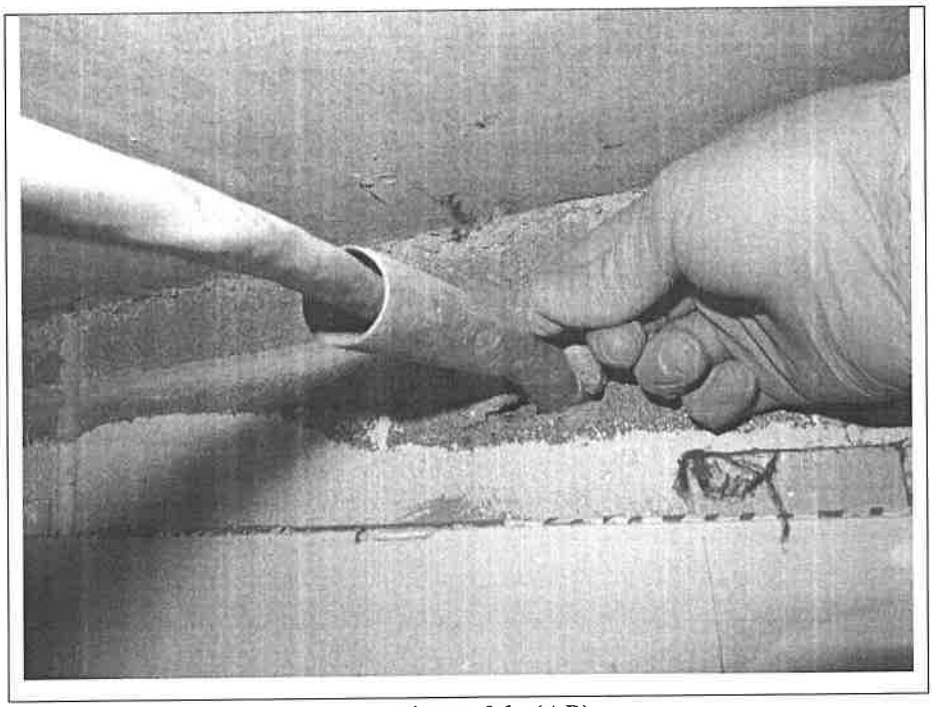


Figure 96. (AP)

Figure 97. (AP)

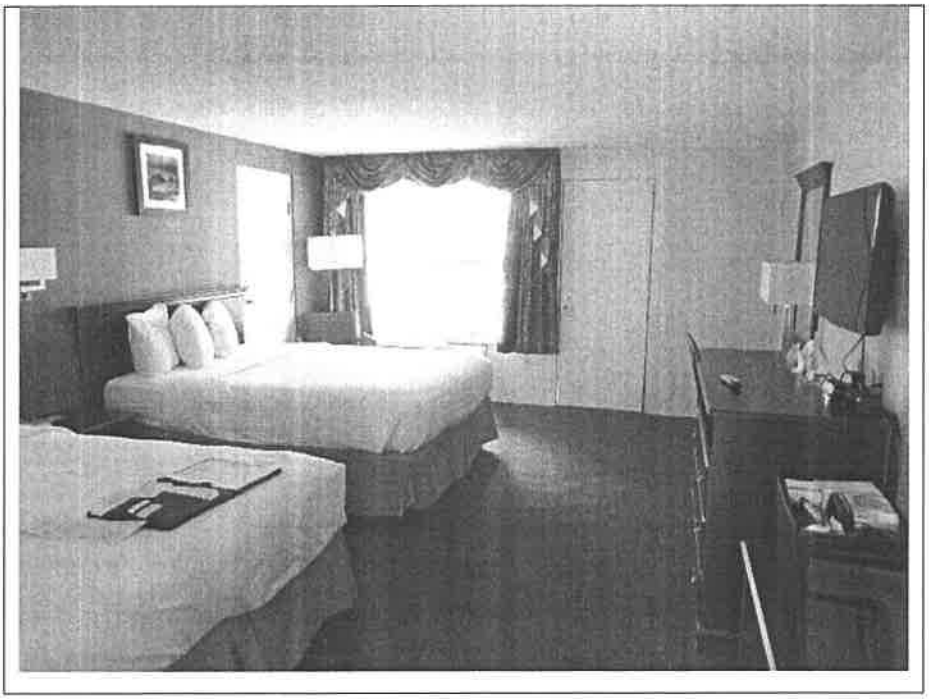
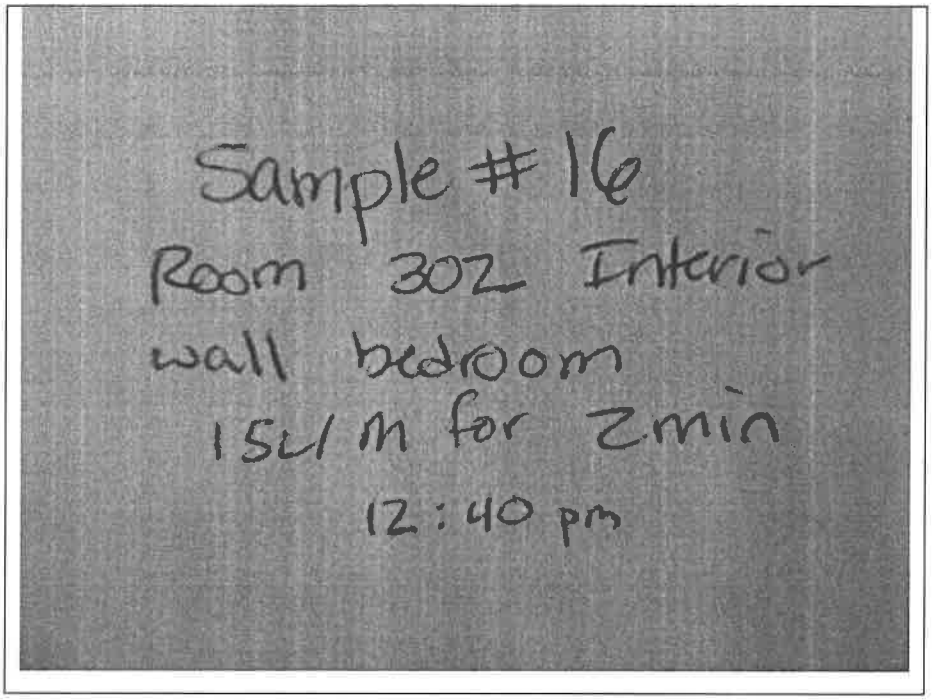


Figure 98. Room overview. (AP)



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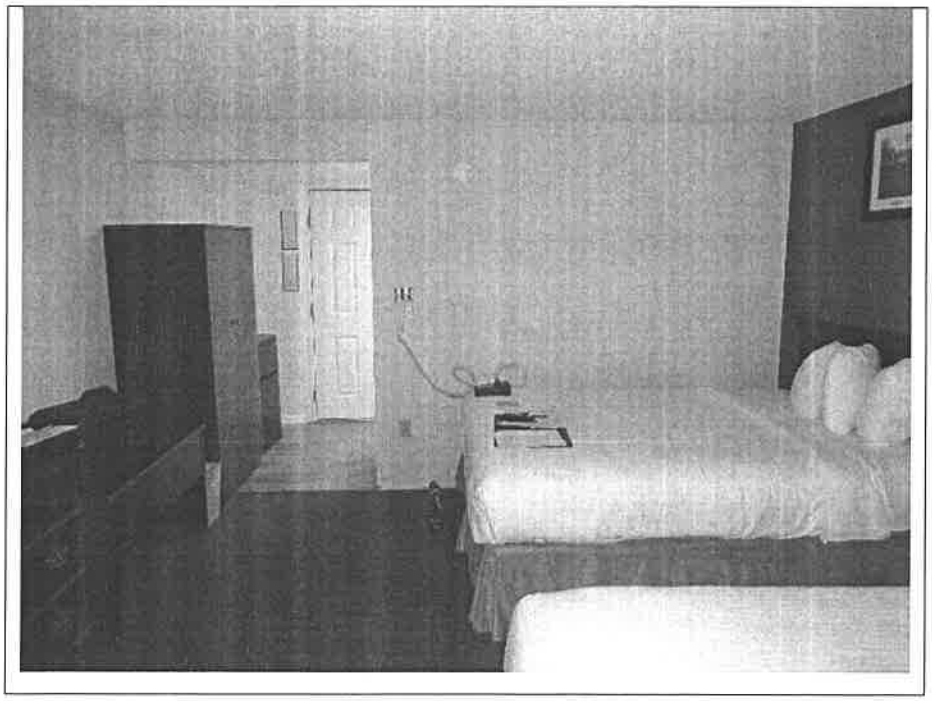
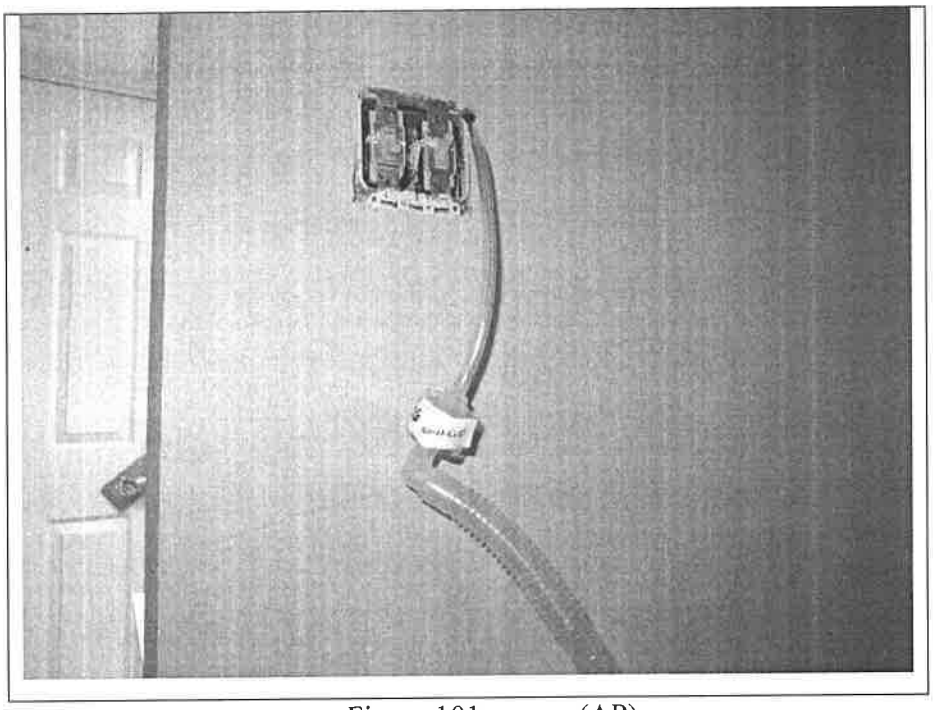


Figure 100. (AP)



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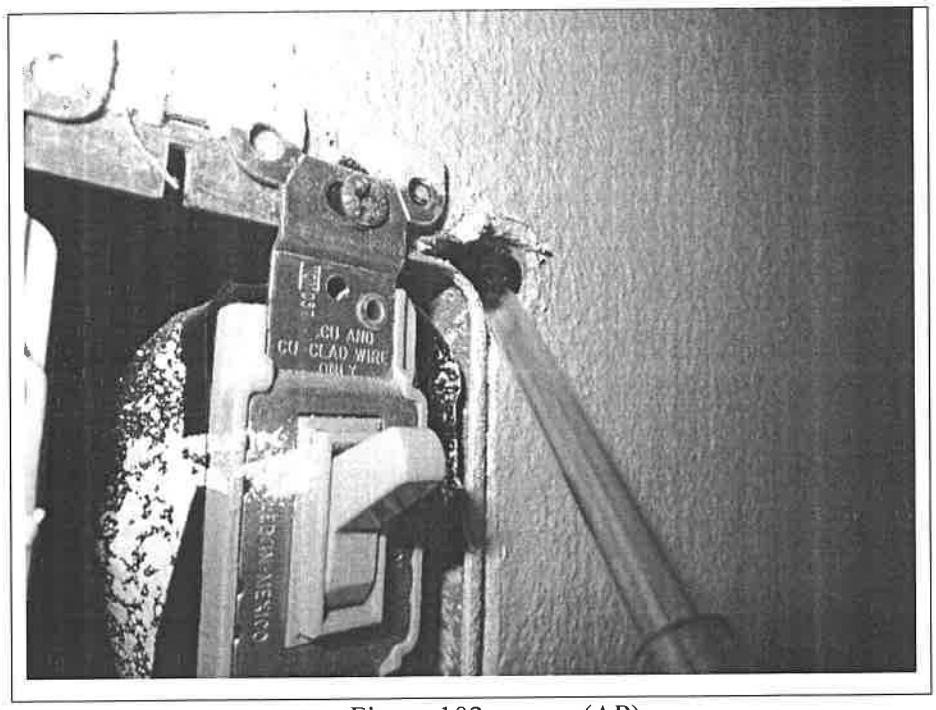


Figure 102. (AP)

Figure 103. (AP)

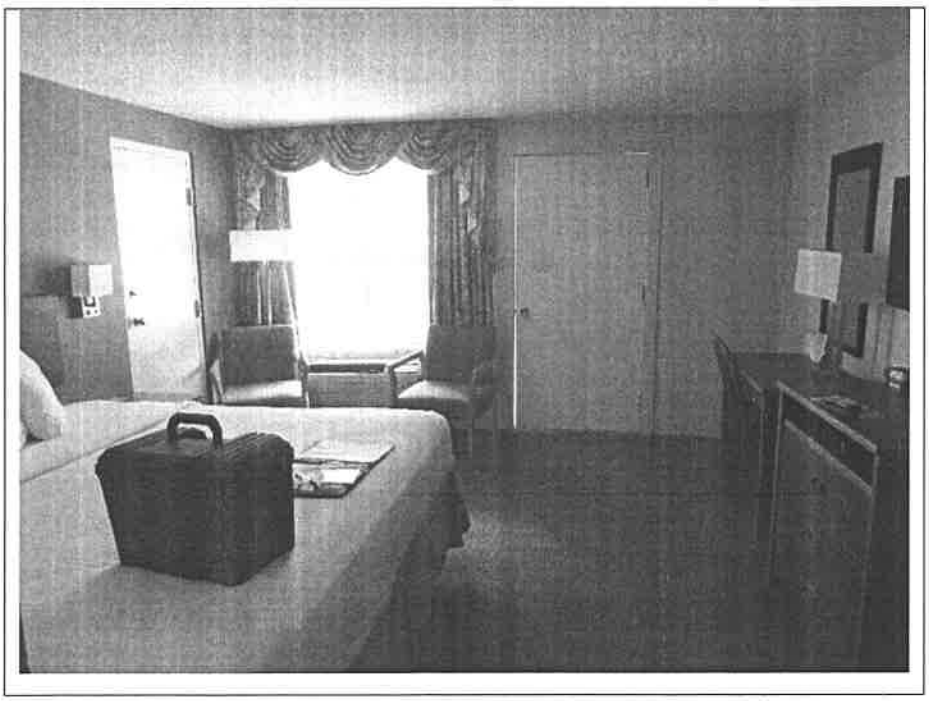
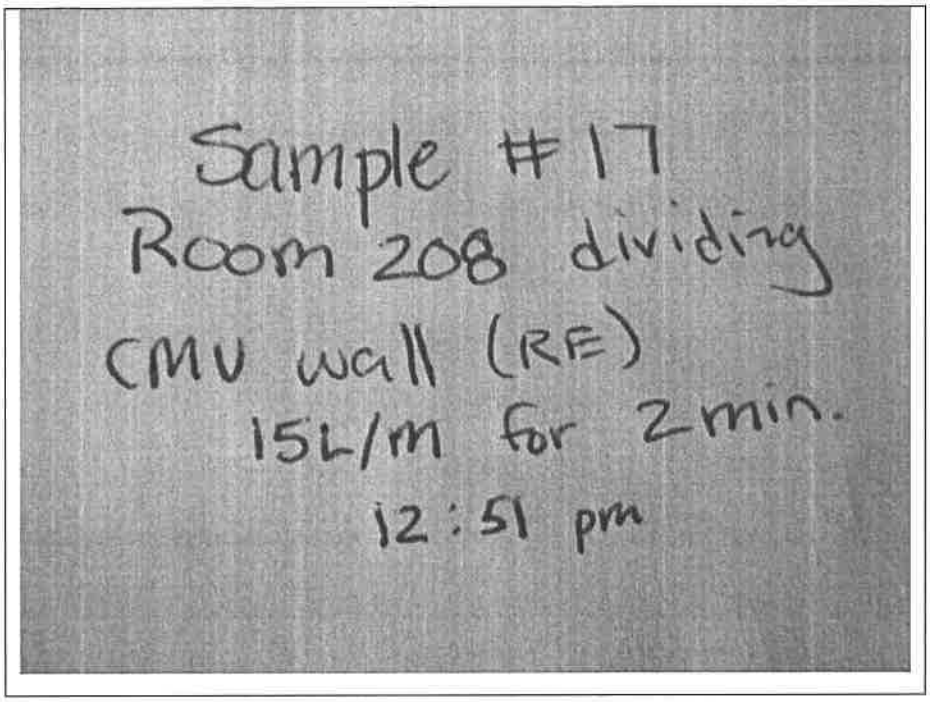


Figure 104. Room overview. (AP)



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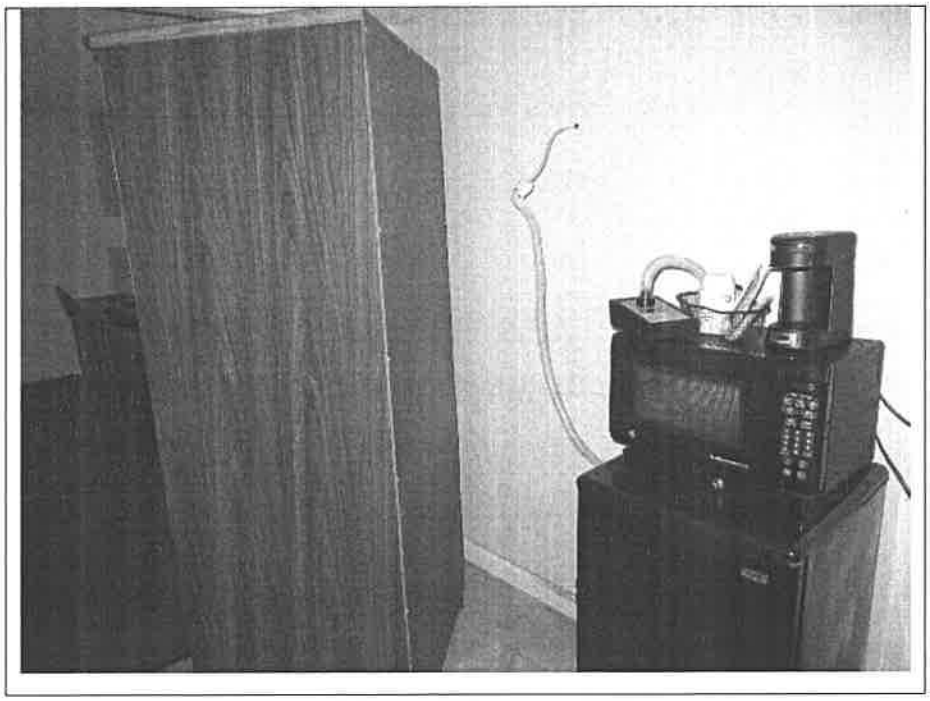

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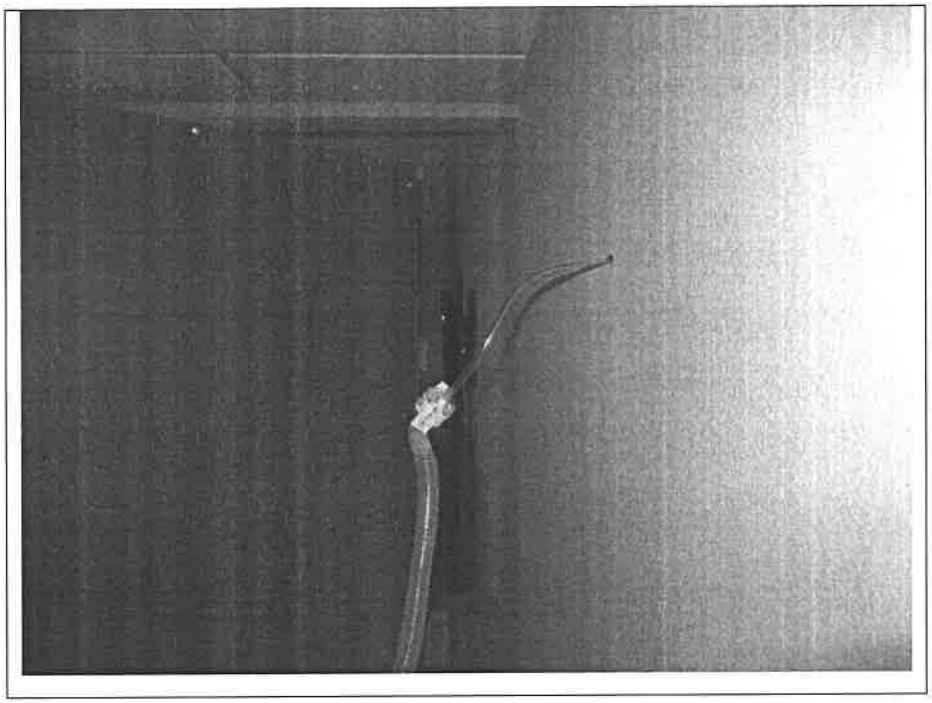

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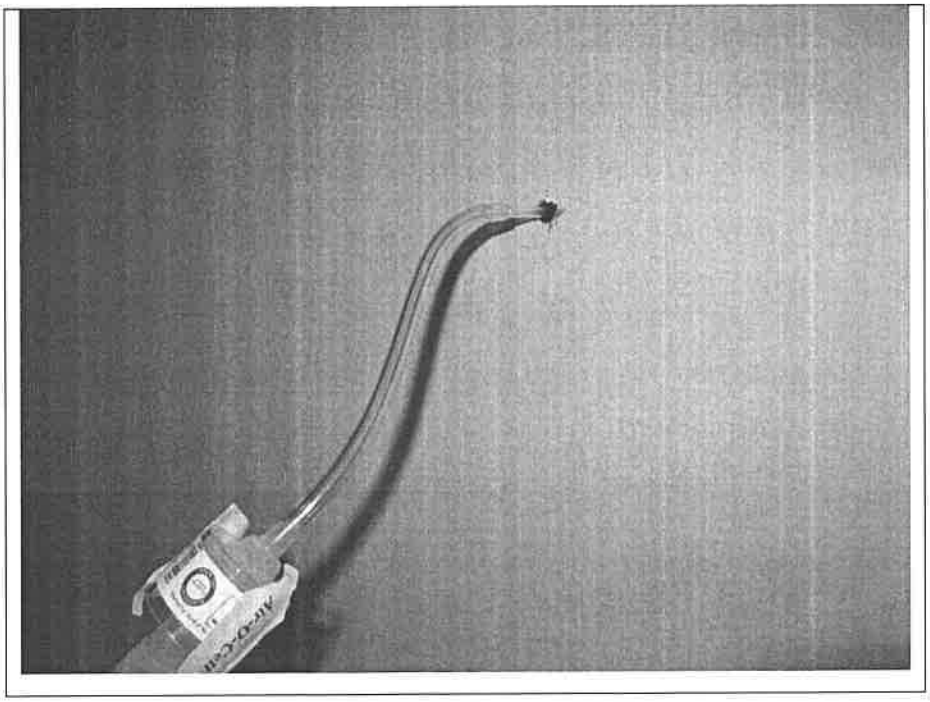


Figure 108. (AP)

Figure 109. (AP)

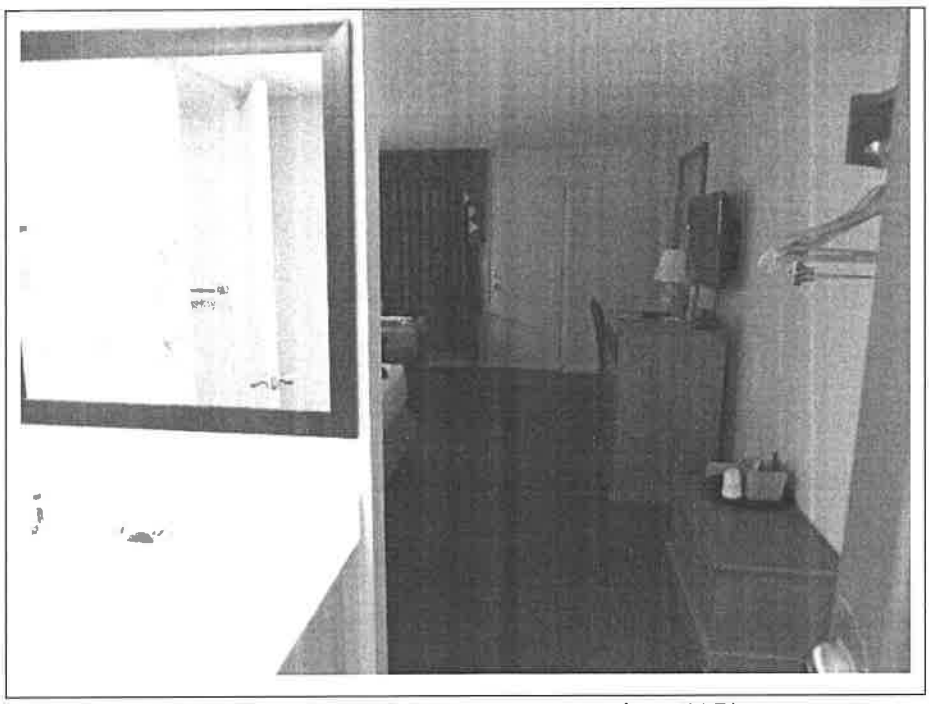


Figure 110. Room overview. (AP)

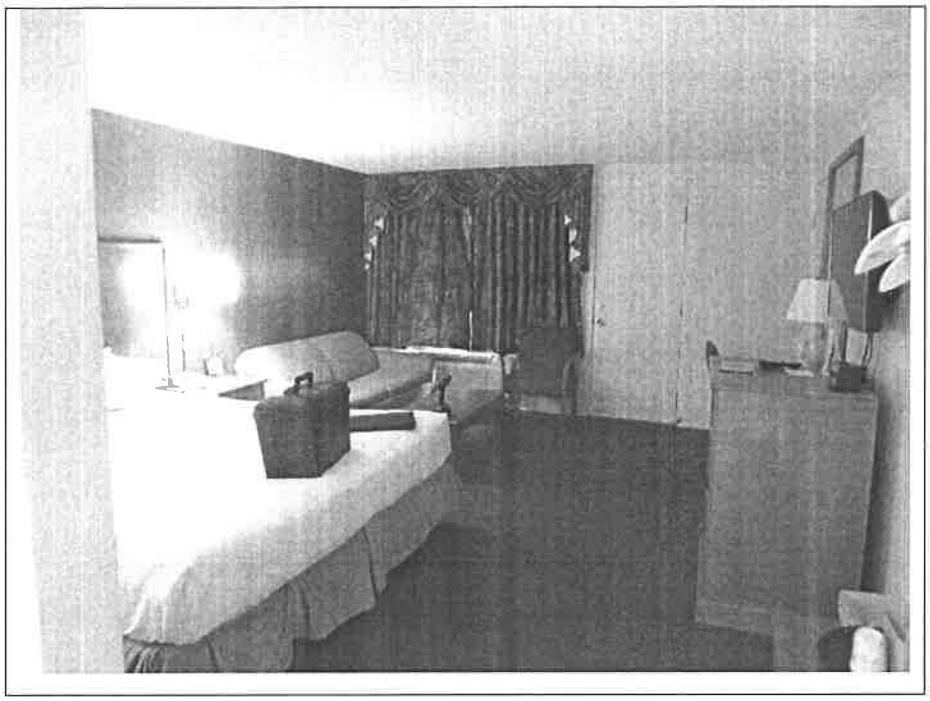


Figure 111. (AP)

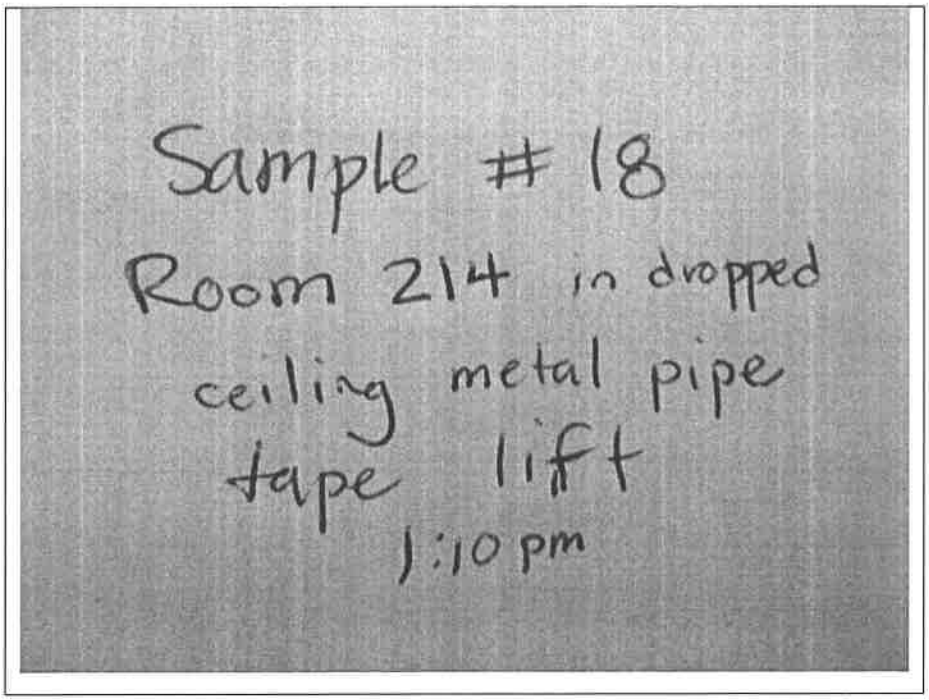


Figure 112. (AP)

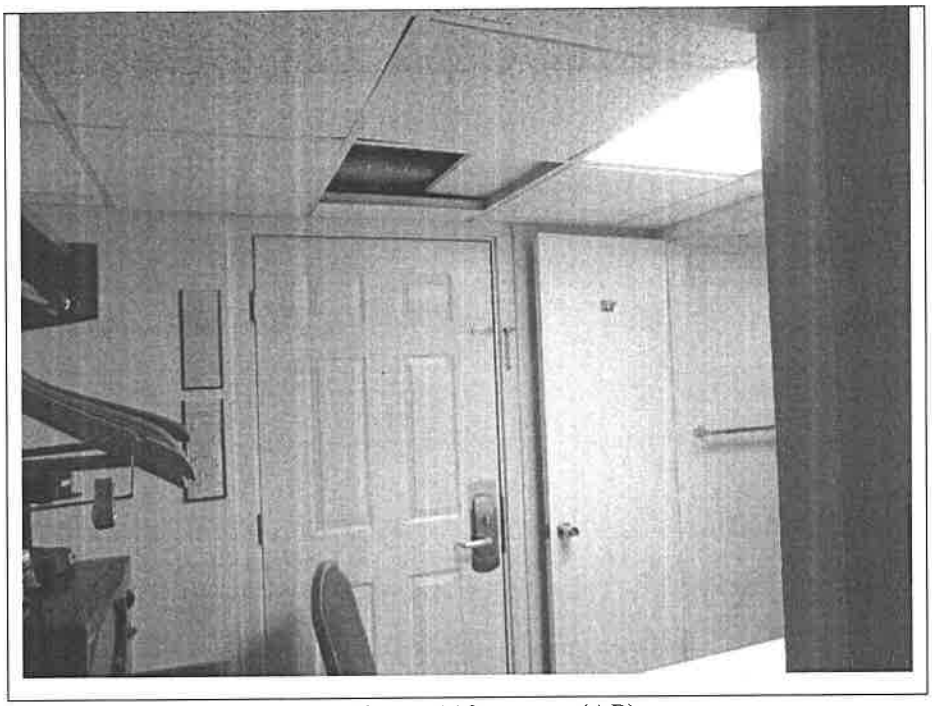
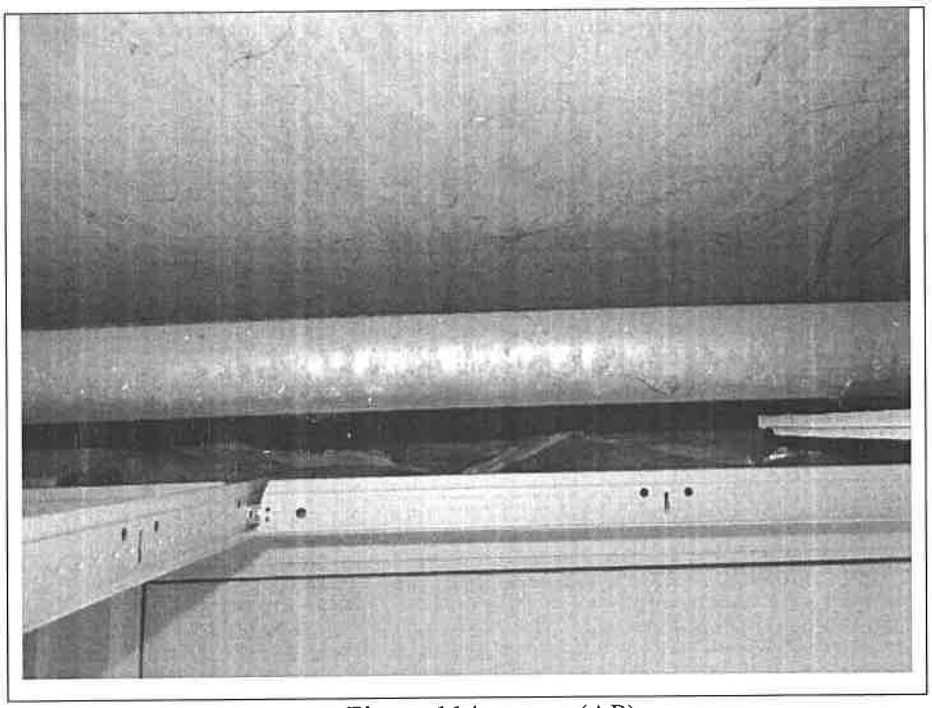


Figure 113. (AP)



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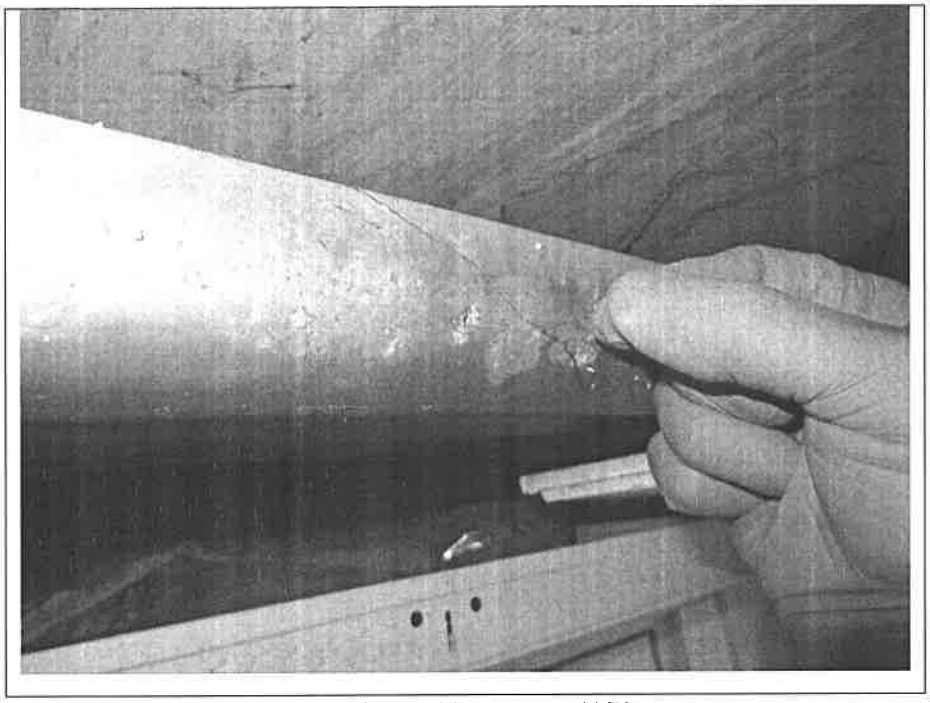


Figure 115. (AP)

Figure 116. 4th floor elevator. (AP)

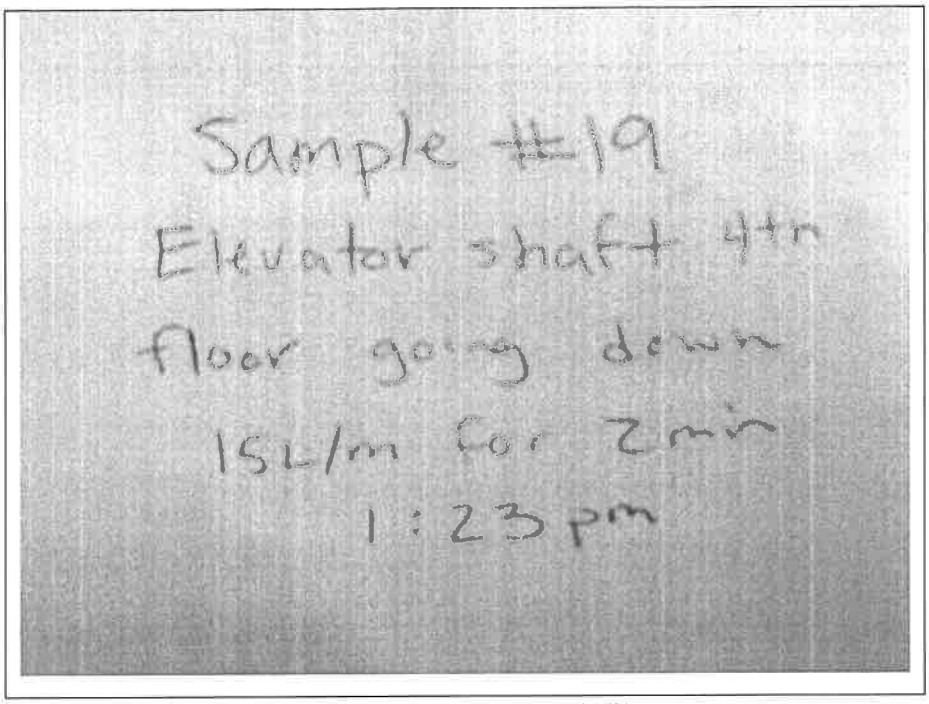


Figure 117. (AP)

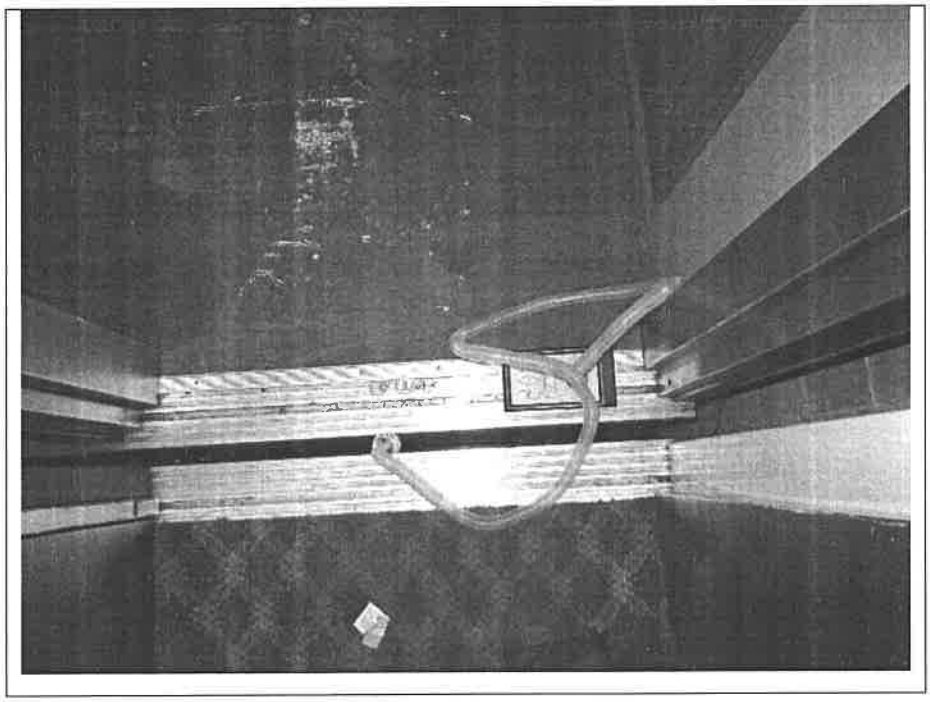


Figure 118. (AP)

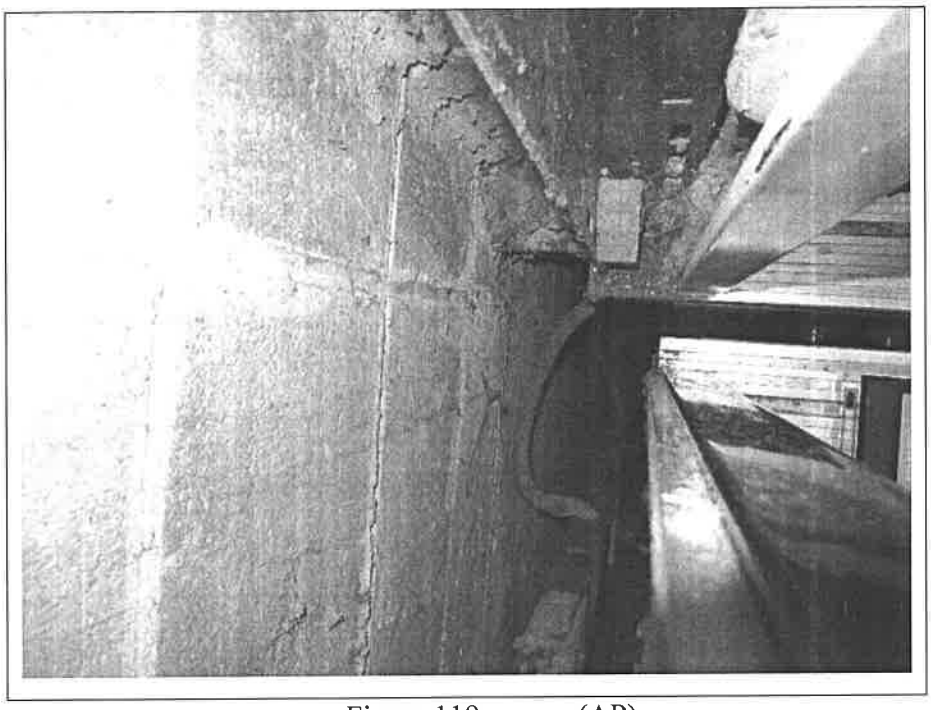


Figure 119. (AP)

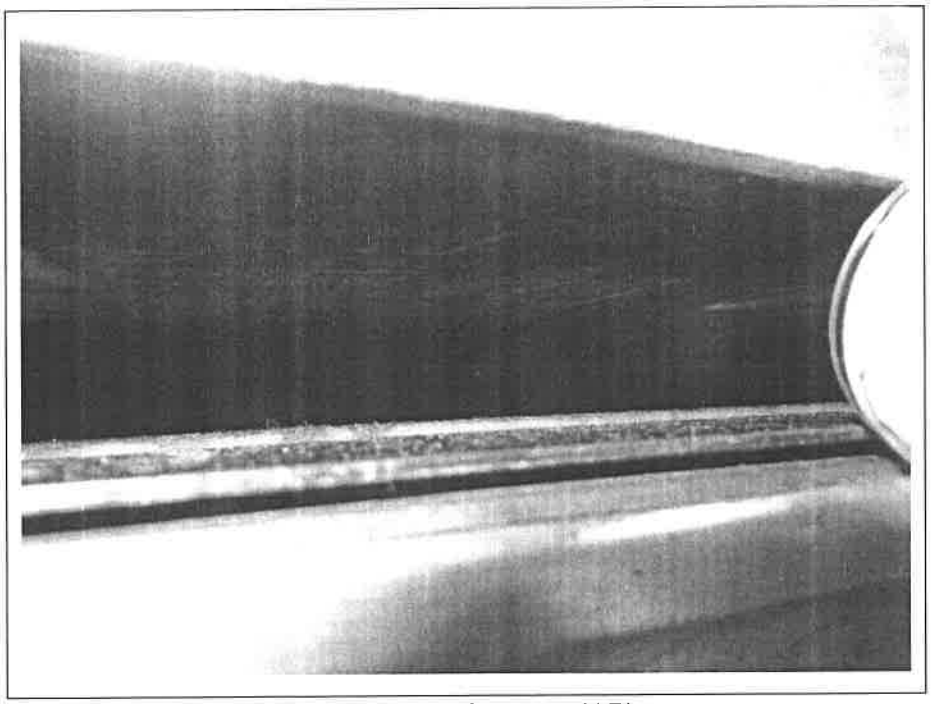


Figure 120. (AP)

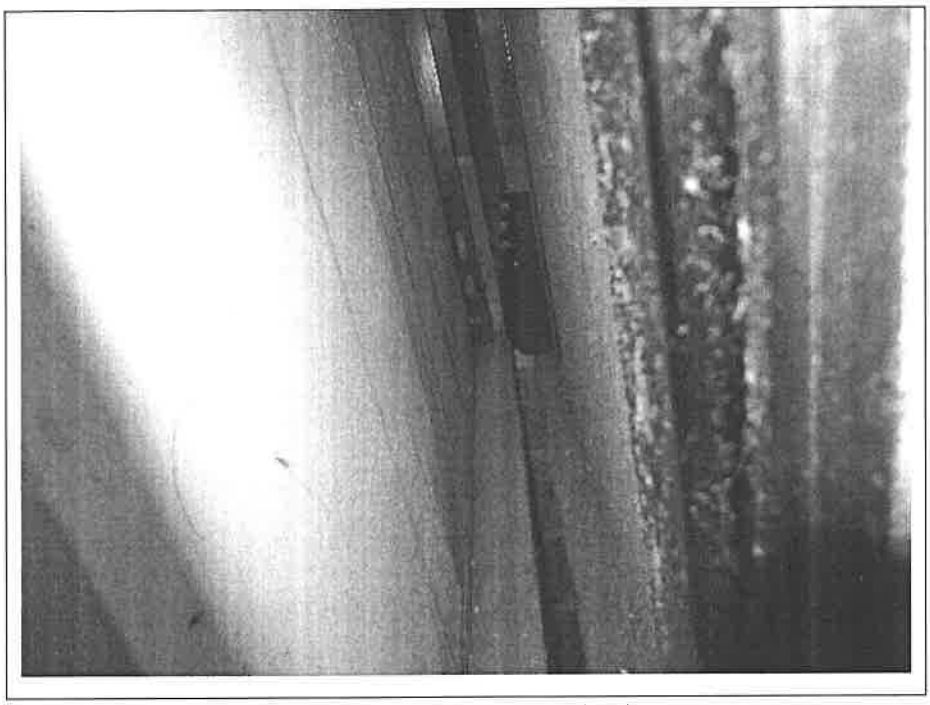
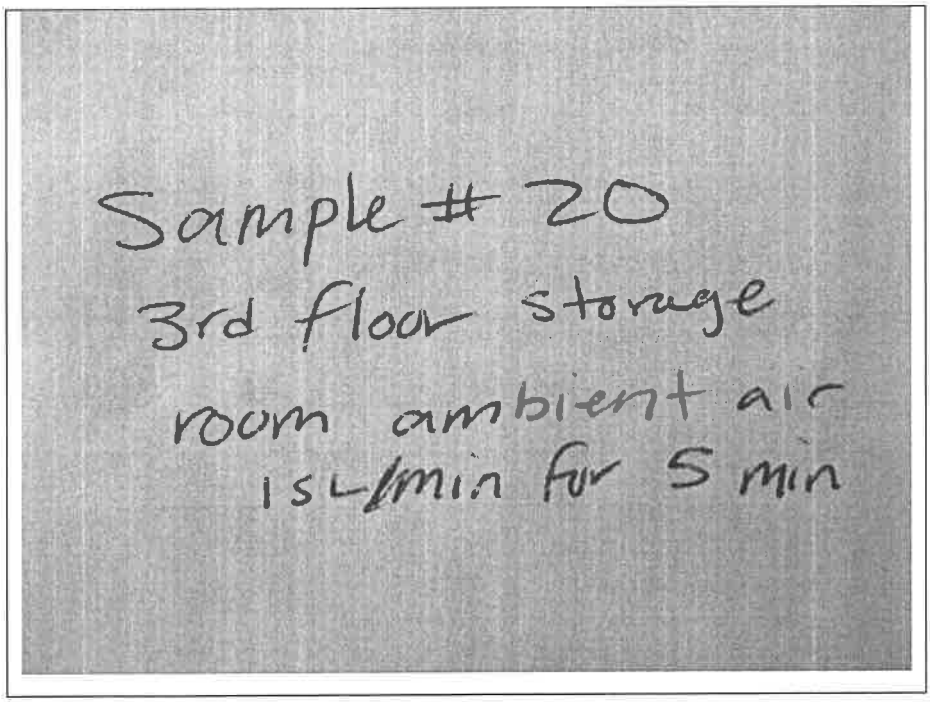


Figure 121. (AP)

Figure 122.



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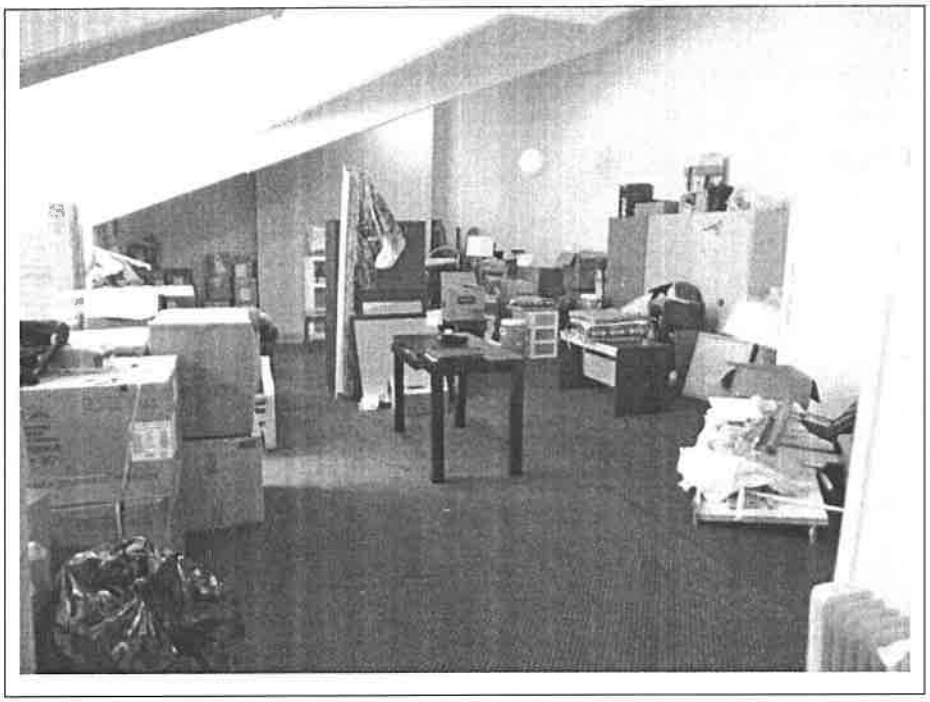

Figure 124. (AP)

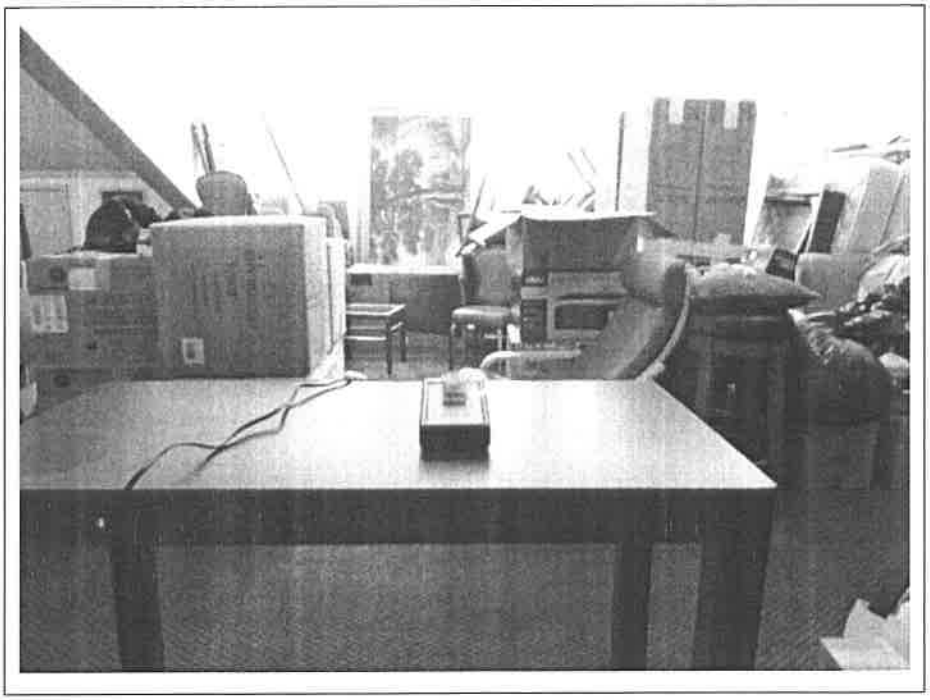

Figure 125. (AP)

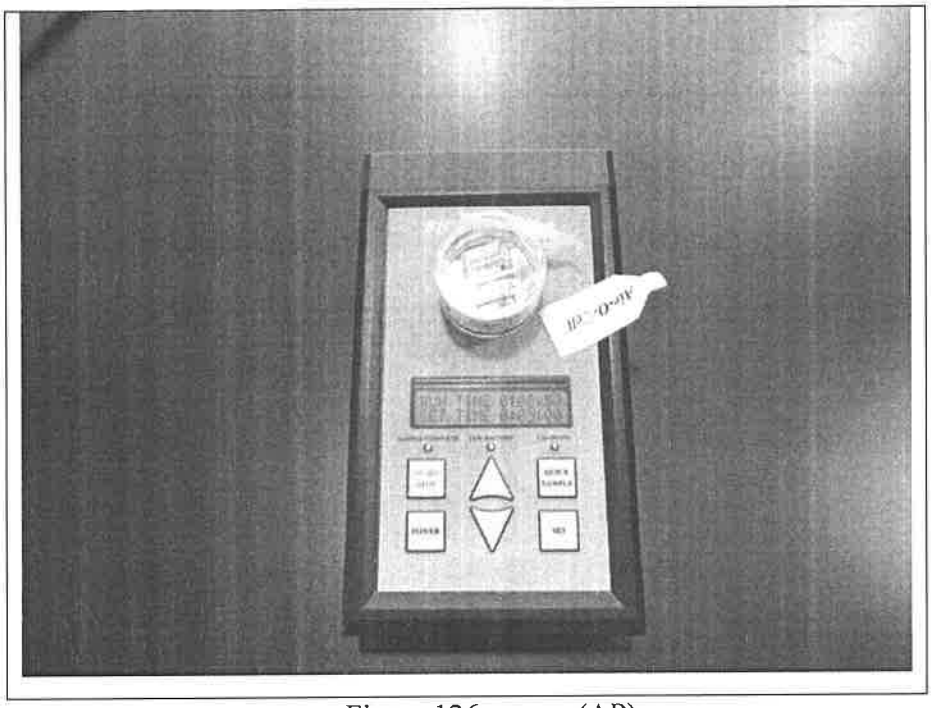

Figure 126. (AP)

NCI Analytical Inc.
216 16th Ave. SW
New Brighton, MN 55112
Phone: 612-626-5714
Pager: 612-621-4819
E mail: carls001@umn.edu

Name: Forensic Building Science, Inc
Address 657 Lincoln Avenue
St Paul, MN 55105
Phone 651.222.6309
Fax 651 528 6237
e-mail. telmuiter@forensicbuildingsciences.com

Sample location: 324 Hemlock St, Gatlinburg, TN 37738

Project Name: Days Inn

Send Billing Invoice to:

Date of Sampling: 01/03/18 - 01/04/18

Sample #	Location & Culture Media	Sample type (B) bulk (F) cassette filter (A) Andersen air (C) contact agar (T) tease tape (O) other; describe	Counts	Type and Number of Organisms
1	Room 407 interior wall 15L/m for 2 min.	F		
2	Room 407 wood burning fire place tape lift	T		
3	Attic space above rooms 403 & 404, wood joist tape lift	T		
4	Room 405 bathroom ventilation 15L/m for 2 min	F		
5	Attic space above rooms 409-412 metal pipe tape lift	T		
6	Attic space above rooms 409-412 cmu interior fire wall 15L/m for 2min	F		
7	Attic space above rooms 418-422 wood joist tape lift	T		
8	Attic space above rooms 418-422 bulk insulation	B		
9	Room 412 dividing cmu (LE) wall 15L/m for 2 min	F		
10	Room 417 interior wall bathroom vanity 15L/m for 2min	F		

Sample(s) collected by: Adam Picco

Remitted to: Neil G Carlson Date: 1/10/18 Recipient Signature:

Remitted to: Date: Recipient Signature:

Remitted to: Date: Recipient Signature:

Remitted to: Date: Recipient Signature:

Remitted to: Date: Recipient Signature:

Analysis by: Neil G. Carlson, Date: 1/12/2018

Printed Name / Signature

NCL Analytical Inc
216 16th Ave SW
New Brighton, MN 55112
Phone: 612-626-5714
Pager: 612-621-1819
Email: cmls001@umn.edu

Name: Forensic Building Science, Inc (Page 2 of 2)
Address: 657 Lincoln Avenue
St. Paul, MN 55105
Phone: 651.222.6509
Fax: 651.528.6237
e-mail: teirmiter@forensicbuildingscience.com

Sample location: 324 Henkel St., Gatlinburg, TN 37738

Project Name: Days Inn

Send Billing Invoice to:

Date of Sampling: 01/03/18 - 01/04/18

Sample #	Location & Culture Media	Sample type (B) bulk (F) cassette filter (A) Andersen air (C) contact agar (T) tease tape (O) other; describe	Counts	Type and Number of Organisms
11	Room 421 wood burning fire place tape lift	T		
12	Room 421 dividing CMU wall (LE) 15L/m for 2min.	F		
13	Room 319 dividing CMU (LE) wall 15L/m for 2min	F		
14	Room 315 bedroom interior wall 15L/m for 2min	F		
15	Room 305 dropped ceiling in bathroom metal pipe electrical chaseway tapelift	T		
16	Room 302 bedroom interior wall 15L/m for 2min	F		
17	Room 208 dividing CMU (RE) wall 15L/m for 2min	F		
18	Room 214 metal pipe in dropped ceiling tape lift	T		
19	Elevator shaft 4th floor going down 15L/m for 2min	F		
20	3rd floor storage room ambient air 15L/m for 5min	F		

Sample(s) collected by: Adam Piers

Remitted to: Neil G Carlson Date: 1/10/18 Recipient Signature: Neil G Carlson

Remitted to: _____ Date: _____ Recipient Signature: _____

Remitted to: _____ Date: _____ Recipient Signature: _____

Remitted to: _____ Date: _____ Recipient Signature: _____

Remitted to: _____ Date: _____ Recipient Signature: _____

Analysis by: Neil G Carlson, Neil G Carlson Date: 1/12/2018
Printed Name / Signature